

20010606.qrp v02\_n212.qrl.20010606

Date: Wed, 6 Jun 2001 19:03:13 EDT

From: qrp-l@Lehigh.EDU

To: "Low Power Amateur Radio Discussion" <qrp-l@Lehigh.EDU>

Subject: QRP-L digest 2212

## QRP-L Digest 2212

Topics covered in this issue include:

- 1) [99476] Re: PSK for Linux  
by "laura halliday" <marsgal42@hotmail.com>
- 2) [99477] Re: Time and date website  
by "John J. McDonough" <wb8rcr@arrl.net>
- 3) [99478] Poles...aluminun and bamboo etc...  
by "T.W." <wb5qyt@abq.com>
- 4) [99479] RE: Telescoping Poles?  
by N1EU <n1eu@yahoo.com>
- 5) [99480] TEST MESSAGE  
by Fran Flynn <fflynn@adelphia.net>
- 6) [99481] Ten Tec Century 21 :  
by "Gene Sailsbury" <gsailsbury@mobil1.net>
- 7) [99482] Your Test Message Is Garbled  
by "James R. Duffey" <jamesd1@flash.net>
- 8) [99483] FOX - Pesky Texan Fox Hunt  
by "N1LN" <n1ln@earthlink.net>
- 9) [99484] W6MMA MP-1 Mobile Setup  
by "N7SG K7FD" <k7fd@hotmail.com>
- 10) [99485] oscilloscope  
by joe living <jliving2001@yahoo.com>
- 11) [99486] Re: oscilloscope  
by "Tom Dufresne" <tdufresne@neb.rr.com>
- 12) [99487] Re: Help My KAM eprom is not working properly  
by "Donny Sirait" <dsirait@centrin.net.id>
- 13) [99488] Preferred building method? A survey.  
by "Dennis Payton" <dpayton@fwi.com>
- 14) [99489] Wanted: Alliance HD-73 rotor clamps  
by Paul Womble <pwomble1@tampabay.rr.com>
- 15) [99490] Re: Wide posts, how come?  
by "Dan W. Dooley" <dandooley@pipeline.com>
- 16) [99491] kd1jv homepage, finally!  
by "Steven Weber" <kd1jv@moose.ncia.net>
- 17) [99492] multiband dipole ant  
by DENNIS SMITH <ne4o@swbell.net>
- 18) [99493] Re: multiband dipole ant  
by "George, W5YR" <w5yr@att.net>
- 19) [99494] kd1jv homepage

- by "Steven Weber" <kd1jv@moose.ncia.net>
- 20) [99495] Re: oscilloscope  
by Stephen Trier <sct@kg8ih.cit.cwru.edu>
- 21) [99496] RE: multiband dipole ant  
by Nick Kennedy <nkennedy@tcainternet.com>
- 22) [99497] WTB: TenTec PM-2A Knobs  
by "Alan Fryer" <qrpdx@earthlink.net>
- 23) [99498] Re: Preferred building method? A survey.  
by "Dennis Payton" <dpayton@fwi.com>
- 24) [99499] QRP+ /++  
by =?iso-8859-1?q?colin=20mackay?= <motorspatz@yahoo.co.nz>
- 25) [99500] FS 1N4148 Diodes (STILL HAVE SOME)  
by "Rod Cerkoney, NØRC" <rod@n0rc.com>
- 26) [99501] Re: oscilloscope  
by John Wagner <john@neknetwork.com>
- 27) [99502] info  
by "T.W." <wb5qyt@abq.com>
- 28) [99503] Re: Extreme OT: Realistic DX-160 Receiver  
by Bill Coleman <aa4lr@arrl.net>
- 29) [99504] RE: Time and date website  
by "Lofstead, Jerry" <Jerry.Lofstead@itb.mckhboc.com>
- 30) [99505] RE: [99348] Re: Op Amps. Interchangeable?  
by Tayloe Dan-P26412 <Dan.Tayloe@motorola.com>
- 31) [99506] RE: Unicounter Problem - NOT!  
by "Wishart, John" <John.Wishart@compaq.com>
- 32) [99507] Heath Grid meter sold  
by Bob cutter <ki0g@yahoo.com>
- 33) [99508] Ah, the discoveries I make . . .  
by Nils R Young <nilsbull@juno.com>
- 34) [99509] hotrodding the NC20: any new mods?  
by agtaylor@llnl.gov
- 35) [99510] Re: HF and the elevation advantage  
by Bill Coleman <aa4lr@arrl.net>
- 36) [99511] Re: HF and the elevation advantage  
by Bill Coleman <aa4lr@arrl.net>
- 37) [99512] Re: Wide posts, how come?  
by Tayloe Dan-P26412 <Dan.Tayloe@motorola.com>
- 38) [99513] Re: Wide posts, how come?  
by "Bill Jones" <kd7s@psnw.com>
- 39) [99514] Results from NEQRP SSB NET Tuesday 7:00PM EDT 7.285 +- 5  
by "Ronald A Pfeiffer" <Ronald\_A\_Pfeiffer@raytheon.com>
- 40) [99515] wanted: H/PC 660 LX laptop stuff?  
by "Doyle, Ronald D" <RD130947@exchange.DAYTONOH.NCR.com>
- 41) [99516] Re: The Complete DXer  
by "Jay Bromley" <w5jay@alltel.net>
- 42) [99517] Hamboree 25 and Iowa State QRP Convention.  
by "John Burnley" <JBurnley@ifmc.org>
- 43) [99518] OSCOPE TUTORIAL - INTRO

by "Paul Harden, NA5N" <na5n@rt66.com>  
44) [99519] OSCOPES - PART 1  
by "Paul Harden, NA5N" <na5n@rt66.com>  
45) [99520] OSCOPES - PART 2  
by "Paul Harden, NA5N" <na5n@rt66.com>  
46) [99521] OSCILLOSCOPE  
by "Richard Brummer, K2JQ" <k2jq@bestweb.net>  
47) [99522] OSCOPES - PART 3  
by "Paul Harden, NA5N" <na5n@rt66.com>  
48) [99523] OSCOPE - PART 4  
by "Paul Harden, NA5N" <na5n@rt66.com>  
49) [99524] NFS 1N4148 diodes ALL GONE  
by "Rod Cerkoney, NØRC" <rod@n0rc.com>  
50) [99525] Re: OSCOPE TUTORIAL - INTRO  
by Phil Wheeler <w7ox@earthlink.net>  
51) [99526] Re: HF and the elevation advantage  
by Curt Milton <wb8yyy@yahoo.com>  
52) [99527] Interesting Used Scope and Test Equipment Site  
by "Rick Austin" <rick@ltcable.com>  
53) [99528] email change notification  
by "Rod Cerkoney, NØRC" <rod@n0rc.com>  
54) [99529] TAC 2001 Sprint Results  
by "Ron Polityka" <wb3aal@fast.net>  
55) [99530] MH101: Transmit strip completed!  
by "Robert P. Okas" <vintage@best.com>  
56) [99531] Nice site  
by "T.W." <wb5qyt@abq.com>  
57) [99532] Re: Wide posts, how come?  
by "Dave Marling" <dbm@klis.com>  
58) [99533] Tektronix 547 Probes?  
by "Rick Austin" <rick@ltcable.com>

-----  
Date: Tue, 05 Jun 2001 16:09:44 -0700  
From: "laura halliday" <marsgal42@hotmail.com>  
To: qrp-l@lehigh.edu  
Subject: [99476] Re: PSK for Linux  
Message-ID: <F71SftNtzsG06vdGg1f00007efd@hotmail.com>  
Mime-Version: 1.0  
Content-Type: text/plain; format=flowed

Brad KI00T wrote:

>(snip...)  
>  
>As User  
>

```
>did ---  chmod u+s twpsk
```

Look at the chmod man page - this probably isn't what you wanted to do. Unless you're root, or are running a private database or something, setuid to yourself accomplishes nothing.

```
>run using either twpsk or twpsk -t/dev/ttyS1
```

```
>
```

```
>error
```

```
>using full duplex mode
```

```
>*cannot open PTT device /dev/ttyS1: no such file or directory
```

```
>run_master_thread()
```

```
>using 24 bpp true color
```

There's your error: does /dev/ttyS1 exist? What are the permissions on it?

```
Laura Halliday VE7LDH      "Que les nuages soient notre  
Grid: CN89mg                pied a terre..."  
ICBM: 49 15.042 N 122 59.053 W      - Hospital/Shafte
```

---

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Date: Tue, 5 Jun 2001 19:33:23 -0400

From: "John J. McDonough" <wb8rcr@arrl.net>

To: "Low Power Amateur Radio Discussion" <qrp-l@Lehigh.EDU>

Subject: [99477] Re: Time and date website

Message-ID: <013201c0ee17\$ebfc1a80\$010044c0@baycty1.mi.home.com>

MIME-Version: 1.0

Content-Type: text/plain;

charset="iso-8859-1"

Content-Transfer-Encoding: 7bit

For those who may not be aware, the National Institute of Standards provides an online time base ([time.nist.gov](http://time.nist.gov)). This is not a website, but time service that, when asked, tells an appropriate program what time it is.

On Windows, there are any number of programs you can run that will check periodically and update your system time. I happen to use a program called WorldTime (<http://www.pawprint.net/wt/>) which allows me to display a configurable number of clocks, but there are an endless number of programs out there that do the same thing, some probably better. I downloaded this one about 4 years ago and never saw a need to change.

On Linux, the capability is built right in. Just type "rdate -s time.nist.gov" and the time gets set according to the National Institute of Standards.

Some of these programs account for network delays, others don't. So if you want to know the time to within a fraction of a second, you better research the particular program a bit.

It is nice, though, to know that the time written in your log is correct without having to worry about it.

72/73 de WB8RCR      <http://members.home.com/wb8rcr/index.htm>  
didileydadidah      QRP-L #1446 Code Warriors #35

----- Original Message -----

From: "Rod Cerkoney, N0RC" <n0rc@gmx.net>

Subject: Time and date website

> Folks,  
>  
> Here is a nifty site to help you keep track of  
> day, date and time around the world:

-----  
Date: Tue, 5 Jun 2001 17:48:00 -0600  
From: "T.W." <wb5qyt@abq.com>  
To: <qrp-l@lehigh.edu>  
Subject: [99478] Poles...aluminun and bamboo etc...  
Message-ID: <MABBIKAEJKMHLIDDGMCKIEEICKAA.wb5qyt@abq.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
          charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Gang,

If you need some telescoping aluminum poles...try Wally World. They have some that telescope from about 42 inches to 15 feet in about 5 or 6 sections for 10 bux ea...Look in the golf section. I made a rotatable dipole with 2 of them that I feed with 300 ohm twinlead and use it on 30-10 meters, and works fb. Add about 7' wires off the ends and the antenna with work fb from 40-10 meters. Guess it could be called the Uside down "W" KK6MC special! Only one problem with the WW poles...They are anodized. So, be prepared to use some elbow grease and steel wool for a lil bit to get that crud off!

K Mart has in their garden section a pack of 6ea. 7' long bamboo poles for 5 bux!! Buy two packages and you have enough for a 3 ele quad for 10 meters or cut them down and make a 3 ele quad for 6. The bamboo is nice and staight. Using some aluminum angle, some hose clamps and some all thread for the angle to boom clamps, one could have a really cheap quad.

Get on 6 meters if you can...the band is hot lately. Been hangin' out on 50.096. Looking to work Chuck Carpenter someday I hope!

When 6 is open, MWatts and a coat hanger will make you contacts.

72, Tom WB5QYT....."Have spud will travel!"

-----  
Date: Tue, 5 Jun 2001 17:24:54 -0700 (PDT)  
From: N1EU <n1eu@yahoo.com>  
To: qrp-1@lehigh.edu  
Subject: [99479] RE: Telescoping Poles?  
Message-ID: <20010606002454.13114.qmail@web14606.mail.yahoo.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii

Thanks to all the responses I received. Wanted to post a summary - the best bets seem to be the \$24 South Bend Extendo SD-20 20ft graphite rod available at [www.bigfishtackle.com](http://www.bigfishtackle.com) and the \$18 B&M Black Widow 20ft fiberglass rod available at [www.cabelas.com](http://www.cabelas.com)

Tnx/73,

Barry N1EU  
[www.albany.net/~bg](http://www.albany.net/~bg)

> I'd appreciate suggestions for mail-order vendors  
for  
> inexpensive telescoping aluminum or fiberglass  
poles.  
> I'm looking for a pole that will collapse to about 4  
> ft (walking stick height), and will extend up to  
12ft  
> or higher.

-----  
Do You Yahoo!?

Get personalized email addresses from Yahoo! Mail - only \$35  
a year! <http://personal.mail.yahoo.com/>

-----  
Date: Tue, 05 Jun 2001 20:46:47 -0400  
From: Fran Flynn <fflynn@adelphia.net>  
To: ne4o@swbell.net, qrp-l Discussion <qrp-l@Lehigh.EDU>  
Subject: [99480] TEST MESSAGE  
Message-ID: <3B1D7D77.F49E775F@adelphia.net>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii  
Content-Transfer-Encoding: 7bit

No Sorry, try using more capital letters next time. That makes  
you LOUDER!!

-----  
Date: Tue, 5 Jun 2001 20:01:39 -0500  
From: "Gene Sailsbury" <gsailsbury@mobil1.net>  
To: "Low Power" <qrp-l@Lehigh.EDU>  
Subject: [99481] Ten Tec Century 21 :  
Message-ID: <016001c0ee24\$3f8fdcc0\$98c03fd8@8tracker>  
MIME-Version: 1.0  
Content-Type: text/plain;  
charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Unit is sold. Thanks  
Gene KC0IKY

-----  
Date: Tue, 05 Jun 2001 19:51:48 -0600  
From: "James R. Duffey" <jamesd1@flash.net>  
To: <ne4o@swbell.net>, qrp-l <qrp-l@lehigh.edu>  
Subject: [99482] Your Test Message Is Garbled  
Message-ID: <B742E8D3.A2AC%jamesd1@flash.net>  
Mime-version: 1.0  
Content-type: text/plain; charset="US-ASCII"  
Content-transfer-encoding: 7bit

Your test message is garbled here. It came through with all caps, multiple  
or missing punctuation, and no content. :^)= Duffey

--

James R. Duffey KK6MC/5  
30 Casa Loma Road  
Cedar Crest, NM 87008

-----  
Date: Tue, 5 Jun 2001 21:34:03 -0500  
From: "N1LN" <n1ln@earthlink.net>  
To: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99483] FOX - Pesky Texan Fox Hunt  
Message-ID: <023601c0ee31\$2974c2e0\$feb8fea9@im02>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="Windows-1252"  
Content-Transfer-Encoding: 7bit

Are all you Hunters ready - only one more week until the night of the HUNT !  
!!  
See how many of those Pesky Texan pelts you can collect ! ! ! !

THE EVENT WILL BE HELD ON:

Date / Time:  
    UTC: June 13, 2001 @ 01:30 - 03:30 UTC  
    CDT: June 12, 2001 @ 20:30 - 22:30 CDT  
Frequency: 40 Meters - 7.035 - 7.055 (perhaps a bit higher and lower)  
Exchange: <Call><RST><State><Name><Power>

NOTE 1: The starting time - trying to allow for our west coast hunters and  
perhaps some  
better 40 meter propagation.

NOTE 2: This is a QRP event - the less power the Hounds run - the more  
points for the Foxes.

FOX Scoring:

- > 1 point / QSO for Q's with hounds running 3w or more
- > 3 points / QSO for Q's with hounds running 1 - 2 watts
- > 5 points / QSO for Q's with hounds running less than 1 watt
- > 10 points / QSO for DX hounds (excluding Canada)
- > Multiplier = first QSO with a new state / province

TOTAL SCORE: (QSO Points) x Multipliers = Total Score



The FOX with the highest score will win the Pesky Texan Fox Hunt plaque.  
2nd and 3rd Place Certificates will be awarded.

The Hounds that work all Pesky Texans qualify for the official WORKED ALL  
PESKY TEXANS certificate.

To receive the certificate, hounds must send logs and \$1.00 to my home QTH.

Bruce - N1LN  
15283 Runnymede St.  
Conroe, Texas 77384

Hounds that send in their logs with more than 15 contacts logged and \$1.00  
will receive an official Participation Certificate.

NOTE 3: Only the list of OFFICIAL Pesky Texan Fox Calls (listed below)  
will qualify for the Worked All Pesky Texans certificates.

Sponsor: NARS - Northwest Amateur Radio Society of Houston, Texas.  
Coordinator: N1LN - Bruce n1ln@earthlink.net  
Send Logs to: n1ln@earthlink.net

AS OF TODAY - THE FOXES WILL BE

N5TW - Tom  
K10J - OJ  
WA5OJE - Danny  
N5ET - Bob  
W5HNS - Henry  
W5PF - Paul  
N5TU - Earl  
AF5Z - Bob  
W5TB - Doc  
W5USJ - Chuck  
K5LN - Bill  
WF5W - Cal  
K5ZTY - Bill  
W5SB - Bill  
KK5LD - Dan  
W5MJ - Madison  
NM5M - Eric  
KG5U - Dale  
AD5Q - Roy  
N1LN - Bruce

Keep the evening of June 12 - 20:30 CDT to 22:30 CDT open. It will be lots

of fun.

72 - and look for a few more reminders as the night gets closer.

Bruce - N1LN

-----  
Date: Tue, 05 Jun 2001 19:51:13 -0700  
From: "N7SG K7FD" <k7fd@hotmail.com>  
To: qrp-1@Lehigh.EDU  
Subject: [99484] W6MMA MP-1 Mobile Setup  
Message-ID: <F84bz37cfJiY9ZNMjiG00002908@hotmail.com>  
Mime-Version: 1.0  
Content-Type: text/plain; format=flowed

I recently acquired another W6MMA loaded whip, this time opting for the slimmer MP-1 model...just for mobile. If you are considering trying something like this, you may find my installation interesting:

<http://www.teleport.com/~cqdx/mpmobile.htm>

My custom mount has been carrying hamsticks but I now like the flexibility of having 'all bands' with a single MP-1.

73, John K7FD/m

-----  
Get your FREE download of MSN Explorer at <http://explorer.msn.com>

-----  
Date: Tue, 5 Jun 2001 19:53:13 -0700 (PDT)  
From: joe living <jliving2001@yahoo.com>  
To: qrp-1@lehigh.edu  
Subject: [99485] oscilloscope  
Message-ID: <20010606025313.66626.qmail@web10604.mail.yahoo.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii

Hi gang

I would like to buy an oscilloscope to troubleshoot my home brew qrp projects. I don't want to pay a lot

of money and would like to buy one used. Please give me some advice.

Joe W3GW

-----  
Do You Yahoo!?

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-----  
Date: Wed, 6 Jun 2001 03:08:11 +0100  
From: "Tom Dufresne" <tdufresne@neb.rr.com>  
To: <jliving2001@yahoo.com>, "Low Power Amateur Radio Discussion" <qrp-1@lehigh.edu>  
Subject: [99486] Re: oscilloscope  
Message-ID: <004401c0ee2d\$897ec720\$0dba1c41@neb.rr.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Joe: Can you say E-Bay?  
Seriously, check 'em out. I got a neat Heathkit dual trace scope for practically a song. Even found a like NEW manual there. Like 'em or hate 'em, you can still get good deals if ya know where to look and how to snipe!! :)  
Good luck  
72/73's  
Tom

> Hi gang  
> I would like to buy an oscilloscope to  
> troubleshoot  
> my home brew qrp projects. I don't want to pay a lot  
> of money and would like to buy one used. Please give  
> me some advice.  
> Joe W3GW

-----  
Date: Wed, 6 Jun 2001 09:37:57 +0700  
From: "Donny Sirait" <dsirait@centrin.net.id>  
To: <wb2vuo@juno.com>  
Cc: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>

Subject: [99487] Re: Help My KAM eprom is not working properly  
Message-ID: <002101c0ee39\$02344360\$bcee92ca@donnysirait>  
MIME-Version: 1.0  
Content-Type: text/plain;  
charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Hi Kieth,  
<wb2vuo@juno.com> wrote:

> Hi. Keith here in the Depths of the Great Bergen Swamp.  
>  
> The Version 2.85 firmware is old. I believe that it may have been used  
> back before Kantronics went with the EEPROM memory storage for  
> parameters. There might be a backup battery somewhere in the system that  
> needs to be changed  
>  
> If not, Syd, W2ICZ in Buffalo used to have all of the EPROM codes for  
> assorted TNC's He handled the packet networking in western NY back about  
> 10 - 15 years ago. If anyone has the information, he may be the one.

I succeeded to get in touch with Syd and we have arrange a delivery of an old  
eprom, however as the members of this list recommend I will also have a look  
at the 5V regulator section especially the alu electrolytic caps.  
Havent done it before since I am busy building a Soundcard-radio interface  
for  
the HF digital modes and trying the softwares available.  
Have succeeded several QRP PSK31, a Feldhell and some SSTV qso at qrp  
levels but it is quite tough even on 20 meters.  
So anybody would like to have a QRP PSK qso with YB can look for me during  
the day USA local time Normally I am available at 12:00 UTC.

Thank you for you all and especially Keith who lead me to Syd, unfortunately  
he  
is not active since he have to take care of his wife (his wife suffers from  
stroke).

my humble thanks and good luck with qrp de YB1BOD  
Donny  
Bekasi Indonesia

-----  
Date: Tue, 5 Jun 2001 22:27:24 -0500  
From: "Dennis Payton" <dpayton@fwi.com>  
To: <qrp-1@Lehigh.EDU>

Subject: [99488] Preferred building method? A survey.  
Message-ID: <01fc01c0ee38\$9be613e0\$a7a854d1@locke>  
MIME-Version: 1.0  
Content-Type: text/plain;  
charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

I was just talking to someone, wondering what the most popular method of construction is among builders. I assume there's not a problem with me doing this (if there is, I hope someone will let me know), and I don't know if there'll be any interest, but I'd like to try a survey of any willing QRP-L members to get an idea how most of us prefer building.

If you'll email me with your preferred method IN THE SUBJECT LINE, I'll tally everything up and report back at the end of the week. You can say "Manhattan", "Ugly", "Etched Board", "Perfboard", or whatever.

Thanks!

Denny N9JXY  
dpayton@fwi.com

-----  
Date: Tue, 05 Jun 2001 23:28:13 -0400  
From: Paul Womble <pwomble1@tampabay.rr.com>  
To: QRP-L <qrp-l@lehigh.edu>, FP List <fpqrp-l@mpna.com>, flham@qth.net, Cars List <cars@k4ksa.org>  
Subject: [99489] Wanted: Alliance HD-73 rotor clamps  
Message-ID: <3B1DA34D.51DBCA39@tampabay.rr.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii  
Content-Transfer-Encoding: 7bit

I need the two mast clamps that fasten to the bottom of an Alliance HD-73 rotor. These clamps allow for mounting the rotor on a mast or push-up pole.

Please reply with condition and price.

Thanks  
Paul K4FB

-----  
Date: Tue, 5 Jun 2001 22:32:07 -0500

From: "Dan W. Dooley" <dandooley@pipeline.com>  
To: <n6wg@earthlink.net>, "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99490] Re: Wide posts, how come?  
Message-ID: <019f01c0ee3e\$3a37eaa0\$0300a8c0@bergenbrunswick.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Bob, your message and a number of responses referred to IE. Why?

Your mailer should not be IE. It should be either Outlook, Outlook Express - assuming you're using Microsoft products or Netscape mailer or some other email client. Surely not the browser for viewing email messages.

I see you're on Earthlink. So am I. That ISP supports normal POP type mailers such as Outlook. No reason to be using a browser to read mail.

Though it can be done, it's certainly not the best tool for the job, in my opinion. Kinda like using a spreadsheet program to write letters. Works, but.....

I use Outlook Express and can't say that I recall ever seeing an email message wider than the view window. In other words, I've never had to scroll to the right. I can see that happening with Web based mail. That requiring a browser to view. Never a dedicated email client.

Dan W. Dooley WB5TKA Bedford, Texas EM12ku  
e-mail to: dandooley@pipeline.com  
Web site: <http://www.qsl.net/wb9tka>  
SOC #198, FPQRP # -104  
May Goddes love blest ye alle  
"Ancient Pistol, I do partly understand your meaning."

----- Original Message -----

From: "Bob Tellefsen" <n6wg@earthlink.net>  
To: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Sent: Tuesday, June 05, 2001 10:50 AM  
Subject: Wide posts, how come?

> Every so often I see posts here that are about three screen widths wide.  
I  
> have  
> to keep scrolling sideways to read them.  
> Is this due to the sender's email software settings, the reflector, or my

> own email software?  
> I'm using Internet Explorer 5.0 at present.  
> Any ideas?  
> 73, Bob N6WG  
>

-----  
Date: Tue, 5 Jun 2001 23:50:36 +0000  
From: "Steven Weber" <kd1jv@moose.ncia.net>  
To: qrp-l@lehigh.edu  
Subject: [99491] kd1jv homepage, finally!  
Message-ID: <200106060422.f564McL09910@wolf.ncia.net>  
MIME-Version: 1.0  
Content-type: text/plain; charset=US-ASCII  
Content-transfer-encoding: 7BIT

Hi Gang,

I finally broke down and bought a page scanner and figured out how to use Claris lite html editor and how to upload the files to a friends server. (that was a project, finally had to do it manually with the dos ftp commands!)

Anyway, the beginnings of a web page with a photo and some info on the 6<=>20 transverter can now be found at

[www.poniatowski.com/kd1jv/kd1jv.htm](http://www.poniatowski.com/kd1jv/kd1jv.htm)

Lets hope you all don't go there at once and crash my friends home based server! And of course, the site can go up or down at random, as he fusses with it :-)

72,  
Steve, KD1JV in the white Mountains of New Hampshire  
"melt solder"

-----  
Date: Tue, 05 Jun 2001 19:53:23 -0500  
From: DENNIS SMITH <ne4o@swbell.net>  
To: qrp-l@Lehigh.EDU  
Subject: [99492] multiband dipole ant  
Message-ID: <000501c0ee23\$18a7f3a0\$323ffea9@Default>  
MIME-version: 1.0  
Content-type: text/plain; charset="iso-8859-1"

Content-transfer-encoding: 7bit

Hello group I need your opinions on a antenna problem i am having. I cant put up a full size 75 diople so i am having to do the next best thing. My antenna will be a inverted vee 45 feet in the center and 50 ft both sides of center fed with 450 ladder line into a mfj 300 watt roller inductor tuner. I plan to use a 4 to 1 balun outside the house and run rg213 inside. Is this configuration one that will let me work 75 40 30 and 20 meters???

Thanks for the advise. Dennis Smith ne4o

-----

Date: Tue, 05 Jun 2001 23:35:16 -0500  
From: "George, W5YR" <w5yr@att.net>  
To: ne4o@swbell.net  
Cc: Low Power Amateur Radio Discussion <qrp-l@Lehigh.EDU>  
Subject: [99493] Re: multiband dipole ant  
Message-ID: <3B1DB304.9F87108F@att.net>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii  
Content-Transfer-Encoding: 7bit

I would suggest using a 1:1 balun, Dennis. You will never see 450 ohms Z at the input to the ladderline on any band, so no need to try to change 450 to 50. The 1:1 balun will work much better for you. I use a similar arrangement with an 88-ft flattop (20 meter EDZ). The measured input Z to the coax after the balun is around 10 ohms on most bands. That would be 2.5 ohms if I had used a 4:1 balun - not good. I use the W2DU bead balun - simple, easy and very low loss.

Otherwise, it should play very well on 80-10 for you.

72/73, George W5YR - the Yellow Rose of Texas QRP-L 1373 NETXQRP 6

Fairview, TX 30 mi NE of Dallas in Collin county EM13qe  
Amateur Radio W5YR, in the 55th year and it just keeps getting better!  
Icom IC-756PRO #02121 Kachina #91900556 IC-765 #02437

DENNIS SMITH wrote:

>

> Hello group I need your opinions on a antenna problem i am having. I cant  
> put up a full size 75 diople so i am having to do the next best thing. My  
> antenna will be a inverted vee 45 feet in the center and 50 ft both sides of  
> center fed with 450 ladder line into a mfj 300 watt roller inductor tuner. I  
> plan to use a 4 to 1 balun outside the house and run rg213 inside. Is this  
> configuration one that will let me work 75 40 30 and 20 meters???



> Thanks for the advise. Dennis Smith ne4o

-----  
Date: Wed, 6 Jun 2001 00:23:58 +0000  
From: "Steven Weber" <kd1jv@moose.ncia.net>  
To: qrp-l@lehigh.edu  
Subject: [99494] kd1jv homepage  
Message-ID: <200106060455.f564trL22103@wolf.ncia.net>  
MIME-Version: 1.0  
Content-type: text/plain; charset=US-ASCII  
Content-transfer-encoding: 7BIT

Opps, make that

<http://www.poniatowski.com/kd1jv/kd1jv.htm>

Sorry, it's late, I'm excited and I've had a few sips of Quervo gold  
to celerbrate :-))

72,  
Steve, KD1JV in the White Mountains of New Hampshire  
"melt solder"  
<http://www.poniatowski.com/kd1jv/kd1jv.htm>

-----  
Date: Wed, 06 Jun 2001 02:53:11 -0400  
From: Stephen Trier <sct@kg8ih.cit.cwru.edu>  
To: jliving2001@yahoo.com  
Cc: qrp-l@lehigh.edu  
Subject: [99495] Re: oscilloscope  
Message-ID: <3.0.6.32.20010606025311.009069c0@kg8ih.cit.cwru.edu>  
Mime-Version: 1.0  
Content-Type: text/plain; charset="us-ascii"

The best deals will be had at your local hamfest. If you can, take along  
a friend who knows something about 'scopes who can help you shop. One big  
advantage of hamfest buying is that you can try before you buy. The scope's  
calibrator output makes a handy signal source.

eBay tends to be more expensive than hamfests. Before bidding on eBay,  
check the seller's web site, if there is one. Some dealers put items up on  
eBay with their normal price as the opening bid, so buying from the web site  
can be significantly cheaper.

Buying from used-equipment dealers on the web takes some care, because some

dealers are very expensive, some are quite reasonable, and a few sell pure junk. Shop around.

Wherever you buy your 'scope, get a dual trace model. Single trace oscilloscopes are much less useful.

For bandwidth, look for at least 20 MHz, though 10 MHz, 5 MHz, or even 1 MHz can suffice for some tasks. If you are measuring anything other than a sine wave, the 'scope bandwidth should be at least 5 times the fundamental frequency of the signal, with more bandwidth providing a better picture of the waveform. Scopes with >150 MHz bandwidth are very expensive, and some aren't as rugged as their <150 MHz brethren. If you want to be able to spot harmonics on your transmitter's output, consider a scope of 50 MHz or better, budget permitting.

A dual timebase is useful, but not essential. Line trigger is very useful for chasing 60 Hz hum. An external trigger input is handy once in a while.

The best deals are on old tube 'scopes. Old Tektronix tube oscilloscopes can often be had for \$50 all the way down to free-for-the-hauling-away. They are ruggedly built and excellent instruments. They are also large, heavy, and make good space heaters in the winter. They're great instruments all the same, and the price is right if you've got the room for one. Bandwidths range from 1 MHz to 85 MHz, depending on the model and what plug-in is installed.

Transistorized analog scopes are the workhorse for most QRPers. They are compact, light, and reliable. Here in Cleveland, a good 20 or 30 MHz transistorized oscilloscope costs anywhere from \$150 to \$400.

Digital oscilloscopes are the professional's tool these days, and the prices reflect that. The few that show up at hamfests often lack vital features. Get an analog scope.

Don't forget to buy probes. Alligator clips and banana plugs are usable only at very low frequencies. Get two or three good 10X probes or 10X/1X switchable probes.

Probes are one of those items where you get what you pay for, unfortunately. You're best off buying new. Used probes have often been abused and are almost always missing some of the bits and pieces. Buy them only if they are dirt cheap and you can check them out thoroughly before buying.

A decent set of new probes will set you back \$40-\$70 for a pair. (Check your favorite electronics catalogs.) 1X and 100X probes are available, but most don't have enough bandwidth for RF work. A 10X probe is more versatile anyway. Unused surplus Tek or HP probes are very desirable, but hard to find at any reasonable price.

Make sure any 10X or 10X/1X probe you buy can be adjusted to the input capacitance of your 'scope. The 'scope's input capacitance is printed on the front panel next to the BNC or UHF connector, and the probe's adjustment range is often printed right on the probe.

The probe's bandwidth should exceed that of the 'scope by a healthy margin. Otherwise, their frequency rolloffs will add and performance may disappoint.

That's probably more than you wanted to know. Sorry about that. Hope it's useful anyway. :-)

73,  
Stephen

--

Stephen Trier KG8IH        "File names are infinite in length where  
sct@po.cwru.edu           infinity is set to 255 characters."  
                             -- Peter Collinson, "The Unix File System"

-----

Date: Wed, 6 Jun 2001 04:26:40 -0500  
From: Nick Kennedy <nkennedy@tcainternet.com>  
To: "'ne4o@swbell.net'" <ne4o@swbell.net>, Low Power Amateur Radio Discussion  
<qrp-1@Lehigh.EDU>  
Subject: [99496] RE: multiband dipole ant  
Message-ID: <01C0EE40.E3044780.nkennedy@tcainternet.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset="us-ascii"  
Content-Transfer-Encoding: 7bit

I think most folks would say don't bother with the balun, since your impedances are pretty well undefined anyway with this setup. Unless you make a transition to coax near the rig and use a choke balun to limit current imbalance. In this case, the balun isn't really used to match impedances but as I said, to force balanced currents and limit feedline radiation.

Your antenna sounds good, but could be less than optimum on 80 since it's less than half wave. Given that, you do have room for an 80 meter inverted L. Go 45 feet up and then ??? (20 ft or so?) over, for a quarter wave inverted L. Feed at the base with a few radials or good ground rods.

72--Nick, WA5BDU

-----Original Message-----

From: DENNIS SMITH [SMTP:ne4o@swbell.net]

Sent: Tuesday, June 05, 2001 7:53 PM  
To: Low Power Amateur Radio Discussion  
Subject: multiband dipole ant

Hello group I need your opinions on a antenna problem i am having. I cant put up a full size 75 diople so i am having to do the next best thing. My antenna will be a inverted vee 45 feet in the center and 50 ft both sides of center fed with 450 ladder line into a mfj 300 watt roller inductor tuner. I plan to use a 4 to 1 balun outside the house and run rg213 inside. Is this configuration one that will let me work 75 40 30 and 20 meters??? Thanks for the advise. Dennis Smith ne4o

-----  
Date: Wed, 6 Jun 2001 06:23:23 -0400  
From: "Alan Fryer" <qrpdx@earthlink.net>  
To: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99497] WTB: TenTec PM-2A Knobs  
Message-ID: <004901c0ee72\$b832e700\$01c3323f@hppav>  
MIME-Version: 1.0  
Content-Type: text/plain;  
charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Anyone have a junker PM-2 or knobs (4 small and 1 large) that are not being used ? Please let me know. Have lots of stuff to trade.

Alan, N3BJ  
Bent Mountain, VA

-----  
Date: Wed, 6 Jun 2001 06:48:46 -0500  
From: "Dennis Payton" <dpayton@fwi.com>  
To: <qrp-1@Lehigh.EDU>  
Subject: [99498] Re: Preferred building method? A survey.  
Message-ID: <004d01c0ee7e\$a627f3a0\$93a854d1@locke>  
MIME-Version: 1.0  
Content-Type: text/plain;  
charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

A clarification:

I can see there's going to be an area of confusion if you say "etched board". Please specify whether you prefer etching your own board or building a kit.

Thanks again,

Denny N9JXY

-----  
----  
I was just talking to someone, wondering what the most popular method of construction is among builders. I assume there's not a problem with me doing this (if there is, I hope someone will let me know), and I don't know if there'll be any interest, but I'd like to try a survey of any willing QRP-L members to get an idea how most of us prefer building.

If you'll email me with your preferred method IN THE SUBJECT LINE, I'll tally everything up and report back at the end of the week. You can say "Manhattan", "Ugly", "Etched Board", "Perfboard", or whatever.

Thanks!

Denny N9JXY  
dpayton@fwi.com

-----  
Date: Thu, 7 Jun 2001 00:32:18 +1200 (NZST)  
From: =?iso-8859-1?q?colin=20mackay?= <motorspatz@yahoo.co.nz>  
To: qrp-l@Lehigh.EDU  
Subject: [99499] QRP+/++  
Message-ID: <20010606123218.34097.qmail@web11804.mail.yahoo.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=iso-8859-1  
Content-Transfer-Encoding: 8bit

Would someone let me know the essential differences between the Index Labs QRP+ and QRP++.

Cheers Colin ZL1BTT

-----

<http://messenger.yahoo.com.au> - Yahoo! Messenger  
- Voice chat, mail alerts, stock quotes and favourite news and lots more!

-----  
Date: Wed, 6 Jun 2001 06:47:07 -0600  
From: "Rod Cerkoney, N0RC" <rod@n0rc.com>  
To: "Elecraft-list" <elecraft@qth.net>, "Low Power Amateur Radio Discussion" <qrp-  
l@Lehigh.EDU>  
Subject: [99500] FS 1N4148 Diodes (STILL HAVE SOME)  
Message-ID: <014301c0ee86\$cc06a5f0\$6401a8c0@c919125b>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Folks,

I still have plenty of 1N4148 diodes available. About 2000.

Here's the deal:

50 1N4148s shipped CONUS \$3.00

100 1N4148s shipped CONUS \$4.50

\*\*\* "Buy 'em with a buddy special": \*\*\*

500 1N4148s shipped CONUS \$12.00 (~\$0.02 per diode)

Add \$4 to the above prices if you want them shipped USPS  
Priority 2-3 Days.

What to do with them:

Experiment with Diode Ring mixers

TR switches for HB XCVRS

RF Detectors for "on board" self test equipment

OK HBers, here your chance to stock on the cheap.

73, Rod N0RC  
Ft Collins, CO

\*\*\*\*\*

SuperFest 2001 14-Jul-2001  
<http://www.qsl.net/n0rc/hamfest/hamfest.html>  
BE THERE!

\*\*\*\*\*

-----  
Date: Wed, 06 Jun 2001 09:24:25 -0400  
From: John Wagner <john@neknetwork.com>  
To: jliving2001@yahoo.com  
Cc: Low Power Amateur Radio Discussion <qrp-1@Lehigh.EDU>  
Subject: [99501] Re: oscilloscope  
Message-ID: <3B1E2F09.892D93CD@neknetwork.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii  
Content-Transfer-Encoding: 7bit

Having recently bought a scope, and being somewhat but not totally clueless at the time, I feel qualified to comment.

I looked on ebay and found the scopes there were pricey. For some reason people get carried away with "winning" an auction and pay outrageous prices for things. Sure, you can find a deal there ... or not. I also don't like buying something electronic and old without seeing it work first. If you want to get an idea of pricing, search the "closed" auctions on ebay and take an average. The average should be what you'll on the high-end at a hamfest.

The best advice I received was to go to a hamfest, which I eventually had the chance to do. I was fortunate that Fran, KM1Z was there and helped me pick out a decent scope. At the hamfest I found numerous "private" scopes for sale, but most of them looked a bit beat up. I eventually ended up at a dealer who had numerous racks of scopes for sale. All of them had been gone over by a technician and recently calibrated. I bought a Tek 465 with a manual and two new x10 probes. I also got the business card of the dealer.

Most scopes have a calibration signal generator on the front of them. Take someone along who knows what they're doing and have them make sure that the scope is at least calibrated and working according to this signal.

Personally, I felt much better about buying the scope this way. I've used it a bit now and it works great. I've poked through my PixieII and used it on the MH101 project. A couple of nights ago I did I built up a little 555 circuit and worked out various capacitor values with it and

my scope. Very fun.

So my advice is this: go to a large hamfest and shop around amongst the dealers. Get something with at least 50MHz bandwidth, preferably 100MHz and two channels. Make sure the dealer has an actual business and that you can call them if there is a problem. There is an online book at the tektronix website called "ABC's of Oscilloscopes" or something like that - read it.

Good luck, have fun. 73,

John, KB1ENS

joe living wrote:

>

> Hi gang

> I would like to buy an oscilloscope to

> troubleshoot

> my home brew qrp projects. I don't want to pay a lot

> of money and would like to buy one used. Please give

> me some advice.

>

Joe W3GW

>

>

> -----  
> Do You Yahoo!?

> Get personalized email addresses from Yahoo! Mail - only \$35

> a year! <http://personal.mail.yahoo.com/>

--

John Wagner - [john@neknetwork.com](mailto:john@neknetwork.com)

Web page: <http://www.neknetwork.com>

-----  
Date: Wed, 6 Jun 2001 07:06:31 -0600

From: "T.W." <[wb5qyt@abq.com](mailto:wb5qyt@abq.com)>

To: <[qrp-1@lehigh.edu](mailto:qrp-1@lehigh.edu)>

Subject: [99502] info

Message-ID: <MABBIKAEJKMHLIDDGMCKOEFACKAA.[wb5qyt@abq.com](mailto:wb5qyt@abq.com)>

MIME-Version: 1.0

Content-Type: text/plain;

charset="iso-8859-1"

Content-Transfer-Encoding: 7bit

Gang,

Anyone have a Long/Lat program to convert to grid squares they could send me??



Tnx and 72, Tom WB5QYT..."Have spud will travel!"

-----  
Date: Wed, 6 Jun 2001 09:37:08 -0400  
From: Bill Coleman <aa4lr@arrl.net>  
To: <fflynn@adelphia.net>, "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99503] Re: Extreme OT: Realistic DX-160 Receiver  
Message-ID: <1010506093708.JAA13016@gate.iterated.com>  
Mime-Version: 1.0  
Content-Type: text/plain; charset="US-ASCII"

On 5/25/01 8:07 PM, Fran Flynn at fflynn@adelphia.net wrote:

>I would look for bad components, most notably electrolytic capacitors.  
>There shouldn't be that many and they are cheap to buy.  
>  
>Chances are that the alignments have not changed, so save yourself  
>a lot of trouble by not changing alignments only to change them back  
>once you determine that it was not an alignment problem at all in  
>the first place. In something that old I would just go ahead and  
>replace all the electrolytic capacitors. Most of them are probably  
>bad or are about to be.  
>  
>25 years of doing repairs on electronics taught me what to look for.

A DX-160 is a solid-state receiver from the late 70's (I think). It was a follow-on to the DX-150, with the addition of a long wave band (like 150-500 kHz?).

I wouldn't think that the electrolytics of this vintage would necessarily be bad. You might want to do some probing with an oscilloscope beforehand to see if any electrolytics are actually bad.

Note that one thing about solid state gear versus tube gear of the same vintage is that the tremendous heat generated by the tubes tends to shorten component life, especially of these early electrolytics. And the component voltages are higher, which tends to destroy electrolytics if they haven't been "formed" in recent use.

As for the DX-160 itself, I had one of these about 10 years ago, and I remember going in and trying to tune it up. While periodic tune-ups of tube gear are common, solid state gear tended to keep a tune better. Part of the reason is due to heat -- the higher internal temperatures of tube gear would age the components faster, and the thermal cycling from on to off and back would tend to allow the tune settings to drift.

If the receiver works, I wouldn't worry too much about trying to tune it up....

Bill Coleman, AA4LR, PP-ASEL            Mail: aa4lr@arrl.net  
Quote: "Not within a thousand years will man ever fly!"  
      -- Wilbur Wright, 1901

-----  
Date: Wed, 6 Jun 2001 09:55:04 -0400  
From: "Lofstead, Jerry" <Jerry.Lofstead@itb.mckhboc.com>  
To: Low Power Amateur Radio Discussion <qrp-l@Lehigh.EDU>  
Subject: [99504] RE: Time and date website  
Message-ID: <078F21595FA7D411B87B00805FA728E64A480C@atlexc02ntms.hboc.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
      charset="iso-8859-1"

YATS32 is a program that takes into consideration the network traffic etc. You should be able to sync off of a local university also. Locally we have Georgia Tech and they stay in sync with NITS.

Jerry  
W3CDE

-----Original Message-----  
From: John J. McDonough [mailto:wb8rcr@arrl.net]  
Sent: Tuesday, June 05, 2001 7:33 PM  
To: Low Power Amateur Radio Discussion  
Subject: Re: Time and date website

For those who may not be aware, the National Institute of Standards provides an online time base (time.nist.gov). This is not a website, but time service that, when asked, tells an appropriate program what time it is.

On Windows, there are any number of programs you can run that will check periodically and update your system time. I happen to use a program called WorldTime (<http://www.pawprint.net/wt/>) which allows me to display a configurable number of clocks, but there are an endless number of programs out there that do the same thing, some probably better. I downloaded this one about 4 years ago and never saw a need to change.

On Linux, the capability is built right in. Just type "rdate -s

time.nist.gov" and the time gets set according to the National Institute of Standards.

Some of these programs account for network delays, others don't. So if you want to know the time to within a fraction of a second, you better research the particular program a bit.

It is nice, though, to know that the time written in your log is correct without having to worry about it.

72/73 de WB8RCR      <http://members.home.com/wb8rcr/index.htm>  
didileydadidah      QRP-L #1446 Code Warriors #35

----- Original Message -----

From: "Rod Cercone, N0RC" <n0rc@gmx.net>  
Subject: Time and date website

> Folks,  
>  
> Here is a nifty site to help you keep track of  
> day, date and time around the world:

-----  
Date: Wed, 6 Jun 2001 07:48:34 -0700  
From: Tayloe Dan-P26412 <Dan.Tayloe@motorola.com>  
To: "'Dennis Payton'" <dpayton@fwi.com>  
Cc: "QRPL (E-mail)" <qrp-l@lehigh.edu>  
Subject: [99505] RE: [99348] Re: Op Amps. Interchangeable?  
Message-ID: <87568F78ABDCD211A0AC0008C707718B058C2C87@az10exm03.sat.mot.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"

Dennis:

Noise and gain-bandwidth are neat concepts that not many people have heard of or understand, but they are quite simple and very useful to know.

On this very subject, I was flipping through the 2001 handbook looking for the R2 and saw that it is not there anymore. :( However, I did find the "rock bender" receiver that someone else mentioned on the list lately. It is a very simple DC receiver.

It uses a diode mixer as the detector, followed by a TL072 as the first pre-amp (18 nV/SqrtHz). My first thought was that a lower

noise LM833 or a NE5532 (4 nV/SqrtHz) would be better served there, but maybe that won't matter much on 40m.

Then I noticed the op-amp pre-amp feedback resistor was 1 meg, with the 50 ohms out of the mixer as the input resistor.

Hmmm  $1,000,000/50 = 20,000\times$  gain (86 db of gain!). If the TL072 has 4 MHz of gain-bandwidth product, then  $4,000,000/20,000 = 200$  Hz. Therefore, in this configuration, the poor op-amp can sustain a gain of 20,000x up to 200 Hz, where it then runs out of gas.

This means:

- 1) Lots of in band audio mixing (two cw tones will mix to form others) and audio distortion because there is effectively no feedback above 200 Hz.
- 2) At 1 KHz, the most gain the op-amp will deliver is  $4\text{ MHz}/1\text{ KHz} = 4000\times$ , so the audio is emphasizing signals below 200 Hz and rolling off signals above 200 Hz.

Also notice that the majority of gain in the receiver (86 db) is placed before the low pass filter section. This is not good. In order to have good rejection of out-of band strong signals, you want as little amplification as possible before your main filtering section.

My suggestion on this receiver is to use three op-amps instead of two. Maybe a single TL071, and a dual LM833. Set the first opamp for a gain of 100 (40 db), using one of the two low noise op-amps. Make the second opamp the low pass filter as shown using the single TL071. Then after the volume control, insert the second half of the LM833 set for 40 db of gain, then follow up with the LM386 audio amplifier IC.

Look at before and after. Before, a strong signal out of band was amplified by a factor of 4000x (1 KHz) before hitting the low pass filter. Since the op-amp is maxed out, there is lots of audio distortion and audio mixing, and this large signal may drive the op-amp into saturation (rail to rail voltage output) before the safe haven of the low pass filter is reached and the big out-of-band signal filtered out.

The poor little in band audio cw signal we are trying to listen to get creamed by lots of bad stuff, much of which is generated internally by the receiver itself.

In the "after" case, the large signal gets amplified by only a factor of 100 before it gets rejected by the low pass filter. Using a LM833 (15 MHz gain-bandwidth) at a gain of 100, at 1 KHz, the pre-amp op-amp has an open loop gain of  $15\text{ MHz}/1\text{ KHz} = 15,000\times$ . Since we used only 100x, there is an excess gain of 150x or 43 db which is used as feedback to keep distortion

and mixing products under control. The large out-of-band signal then gets filtered out by the low pass filter and the little QRP cw signal we wanted to hear passes cleanly through to the following stages.

In addition, the lower noise LM833 will allow us to have another 12 db of increased sensitivity. I am not sure this is useful on the 40m band, but it is nice to know that the noise you hear from the rig is band noise and not "designed in" receiver hiss.

In addition, the volume control is now much earlier in the gain lineup. Having 86 db of gain in front of the volume control means that large signals in the desired audio pass band can saturate the op-amps before we ever get a chance to turn down the volume. Having only 40 db of gain before the volume control greatly reduces the chances of over loading the op-amps before we get a chance to reduce the signal level with the volume control.

This receiver as designed (the "before" case) has about 120 db of gain, 80 db in the preamp, 40 in the audio amplifier. This is about right for speaker levels. Headphone level requires only about 90 db of gain. Therefore, if this were used with headphones only, I might pick the preamp to be 30 db (32x gain), the low pass filter has unity gain, the second op-amp I introduced have another 32x gain (30 db), with the audio amp chip, 40 db for a total of 100 db.

The point is that by adding one more simple audio stage and using better op-amps, this simple receiver can be improved greatly.

- Dan, N7VE

-----  
Date: Wed, 6 Jun 2001 09:59:39 -0500  
From: "Wishart, John" <John.Wishart@compaq.com>  
To: Ron Stone <rsstone@juno.com>, w9wis@charter.net, kd1jv@moose.ncia.net  
Cc: qrp-l@lehigh.edu  
Subject: [99506] RE: Unicounter Problem - NOT!  
Message-ID: <01D6DAE156EC544B826BFBC6DC7CC45142F90A@cxoexc11.americas.cpqcorp.net>  
MIME-Version: 1.0  
Content-Type: text/plain

Ron, Mike (W9WIS), & Steve (KD1JV),

After we tried all suggestions with little success (all voltages looked good, but improper signal frequency and amplitude & little signal stability at the CPU-2 & 3), we found out what the problem was: a bad BNC cable connection at the test lead coming from the function generator to the Unicounter. This caused no/bad input signal into the Unicounter. After we fixed that with a new cable, the Unicounter worked fine. At 5 MHz, there was

about 130-150 Hz difference, uncalibrated, between the Unicounter display and our HP counter, well within the specs. I calibrated this out and it works great.

Speculation (I'm an ME, not a EE): maybe having the test lead attached even with no signal was enough of an antenna or load on the amplifier circuit to cause it to oscillate somewhat shakily at about 20 Mhz, causing the random readings. When the test lead was detached it was reading zeros, as it should.

Thank you all very much for your prompt and useful assistance.

73,  
John Wishart, KC0JFH

-----Original Message-----

From: Ron Stone [mailto:rsstone@juno.com]  
Sent: Monday, June 04, 2001 10:01 PM  
To: Wishart, John  
Subject: Re: Unicounter Problem

John,

Some more thoughts. From what you've told me, the circuit is operating at least 90% correctly assuming that the initial voltages checked out and the PIC was behaving fine during initial programming. Given the simplicity of the thing, there really aren't too many things left that could go wrong. If you still have a problem after removing the scope and frequency counter, here's what you can do. The basic strategy is to first see if the amplifier is working right (i.e, a proper signal is reaching the PIC, and if it isn't why). With the power off, very carefully remove the PIC from the socket and then attach the scope probe to pin 2 or 3, power it up and apply a 1 V p-p sine wave input signal and you should see a close approximation of a sine wave running from a bit more than 0 volts to less than about 4.8 V. Then try lowering the input voltage to .5 volts p-p and then .1 volts and see how the voltage on pin 2/3 changes. At 5 MHz, it should go down somewhat but stay in roughly the same range as with 1 V (p-p). If all that checks out, then the amplifier is ok and there's probably a problem with the PIC itself or the oscillator circuitry. Let me know what you find out.

72,

Ron (KA3J)

On Mon, 4 Jun 2001 14:06:02 -0500 "Wishart, John"  
<John.Wishart@COMPAQ.com> writes:

> Mike & Ron,  
>  
> Well, removing the ground clip coming from the fxn generator got the  
> signal  
> into the counter and it's giving me digits now. Not the right ones,  
> but  
> digits other than the "0000.". However, now it only gives me 5  
> digits plus  
> the decimal point and it is not consistent (random numbers). I have  
> the low  
> digit programmed at 1 and the high digit programmed at 7. It seems  
> like it  
> should show something close to 5.000000 in sequence when I have a 5  
> MHz  
> signal into it. Any further enlightenment?  
>  
> Thanks for your help.  
> Regards,  
> John Wishart, KC0JFH  
>  
> -----Original Message-----  
> From: Michael Melland [mailto:w9wis@charter.net]  
> Sent: Monday, June 04, 2001 11:33 AM  
> To: Wishart, John  
> Subject: RE: Unicounter Problem  
>  
>  
> > I had it hooked up to a function generator looking at a 5 MHz, 1  
> Volt  
> > peak-to-peak sine wave. I also had an HP frequency counter and an  
> > oscilloscope connected, so I know the test signal was present and  
> > working. I  
> > am using a fresh 9V alkaline battery for the power source. I am  
> using a  
> > standard BNC (50 ohm) cable with a couple of test clips to connect  
> to the  
> > Unicounter RF input lead and ground (about 10" of RG-174).  
>  
> Try removing the ground clip and letting it float..... any  
> difference ?  
>  
> 73 de Mike, W9WIS

---

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<http://dl.www.juno.com/get/tagj>.

-----  
Date: Wed, 6 Jun 2001 08:02:22 -0700 (PDT)  
From: Bob cutter <ki0g@yahoo.com>  
To: qrp-l@Lehigh.EDU  
Subject: [99507] Heath Grid meter sold  
Message-ID: <20010606150222.24298.qmail@web3105.mail.yahoo.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii

Thanks all for your interest.

72, Bob KI0G

-----  
Do You Yahoo!?  
Get personalized email addresses from Yahoo! Mail - only \$35  
a year! <http://personal.mail.yahoo.com/>  
-----

Date: Wed, 6 Jun 2001 11:15:53 -0400  
From: Nils R Young <nilsbull@juno.com>  
To: QRP-L@lehigh.edu, hfpack@yahoogroups.com  
Subject: [99508] Ah, the discoveries I make . . .  
Message-ID: <20010606.111557.-445887.0.nilsbull@juno.com>  
MIME-Version: 1.0  
Content-Type: text/plain  
Content-Transfer-Encoding: 7bit

Y'all,

I noticed the other day a couple things. Like my former ham radio site on the 50megs.com has disappeared. It's still listed in that I can get 'em to tell me what my password is under the URL I had there, but when I get to that URL, I get the "your stuff ain't here, gringo!" message.

So I have had an enjoyable couple three hours moving all that stuff (including a page that I can't find in its final edition & thus need to reconstruct) to my geocities.com site (listed below). Now, this ain't an invitation to go there & then send me email about having so much "Spanish crap" on it or anything. It's just an advisory that I've had to move my radio junk to a different place.

Which also means that I have to start on the rehab of my former general purpose site also on the geocities.com site. Grand plans. So far I've got William Burroughs welcoming the reader into a dark cave during the



pleistocene. Maybe I'll figure it out before Christmas . . .

And last night I got a tiny headset with mic thingie so I can ride around on vacation & talk to people . . . as long as I don't blow the radio up again . . .

Should I take the 6m radio & keep it hosed up to 50.110 SSB or 52.525 FM? Do you think Cindy will notice if there are two antenna mounts on the trunk lid? Can I get away with both antennas on the mounts at the same time, one for HF & one for 2m/6m? And most importantly, will I QRM the CD player she just got so she can listen to Willy Nelson as we cruise across Kansas? (We're actually going to be going through the last place where Burroughs' kah kept its corporeal residence until a couple years ago. Should I stop? I have the address somewhere . . . Maybe there'll be a historical marker . . . Or a bunch of cats sittin' around waiting for dinner.)

Been listening to 7258 in prep. Man, has that frequency undergone a change of occupancy!

73

Nils

. . . went to the store last night for some fizzy water . . . driving along on I-70 all I could see was potential accidents that I would have to avoid . . . I hope I have that kind of prescience for the trip . . . Mom was really good at it . . . She could tell if you were pregnant & what the gender of the child was to be . . . On the road it was different . . . but then, it's a learned response to ecological pressures . . . and pheromones I think sometimes . . . "Don't do anything. They can SMELL your fear!" Above that aroma of burning diesel . . .

-----  
Nils R. Bull Young -- El Gringo Errante -- La Estancia de los Guajolotes  
Sonrientes

W8IJN -- <http://www.geocities.com/nilsbull/w8ijn>

In my day you had to FIGHT to have digits! Every DAY was a STRUGGLE!

--- Comrade Nikolai Sergeevich McTovarishov

-----  
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<http://dl.www.juno.com/get/tagj>.

-----  
Date: Wed, 6 Jun 2001 09:24:23 -0700 (PDT)

From: agtaylor@llnl.gov

To: qrp-1@lehigh.edu  
Subject: [99509] hotrodding the NC20: any new mods?  
Message-ID: <200106061624.JAA03036@poptop.llnl.gov>  
MIME-Version: 1.0  
Content-Type: TEXT/plain; CHARSET=US-ASCII

I haven't seen many posts about the NC20 of late and wonder if there are some wonderful mods lurking out there. My NC20 (club version) goes under the knife soon to do some known mods: xtal filter, AGC, double VR, hotter RF amp (MRF904) at Q7. Are there any other mods that would be of use to a field op guy? I would like to do everything in one mega-session while I have the case off. After the NC20 it is the K2 ssb and 160m/RXant modules.

K7GT

--

Allan G Taylor

agtaylor@llnl.gov

-----  
Date: Wed, 6 Jun 2001 12:25:51 -0400  
From: Bill Coleman <aa4lr@arrl.net>  
To: <k8kfj@ntelos.net>, "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99510] Re: HF and the elevation advantage  
Message-ID: <1010506122551.MAA18248@gate.iterated.com>  
Mime-Version: 1.0  
Content-Type: text/plain; charset="US-ASCII"

On 5/31/01 3:46 PM, Garie Halstead at k8kfj@ntelos.net wrote:

>A question for you propagation gurus out there....  
>  
>I regularly work the VHF contests every year where elevation is  
>extremely advantageous. On the HF bands, I understand it would  
>also be an advantage on 10m and probably to a certain extent on 15m.  
>  
>\*\*\*But what about 20m and down?\*\*\* (Other than having an unobstructed  
>shot in all directions).

The answer (as always) is, "it depends."

Generally speaking, however, HF propagation results in certain apparent angles of arrival. For distant stations, these angles are generally

within a few degrees of the horizon. (However, there are exceptions - multi-hop propagation can tend to raise arrival angles, as can operating well below the MUF)

If we accept that most DX is going to arrive at low angles, then we should construct our antenna system to respond to those low angles. For a horizontal antenna (dipole, yagi), the antenna response at low angles is directly related to the height in wavelengths above ground. This is why height is the signal most important attribute of a horizontal antenna.

Generally speaking, we want a horizontal antenna to be at least 1/2 wavelength above ground, but there are diminishing returns beyond 2 or 3 wavelengths. As the antenna is raised, the pattern of the antenna changes. Get the antenna too high, and you'll find that the antenna becomes LESS responsive to certain arrival angles. (The guys with 10m yagis at 200 feet can tell you there are times when this antenna is too high)

Vertical antennas have patterns that aren't as affected by height. Generally, a vertical has a low angle of radiation, which makes it good for DX, regardless how high it is off the ground. (Ground losses will tend to raise the angle the radiation, so good ground coupling is usually important)

As for terrain, being on a peak, or partway up a slope affects the radiation pattern of antennas as well. If the terrain slopes away from the antenna, that has the same effect as having the antenna be higher (sloping toward looks like lower).

The guys who are really into this stuff (mostly contesters and DXers) go to great lengths to figure this out. There are programs that will tell you what arrival angles to expect signals from various parts of the world (with varying solar conditions), programs that analyse the affect of terrain on antenna patterns, programs to determine the antenna patterns at various heights.

Bill Coleman, AA4LR, PP-ASEL                      Mail: aa4lr@arrl.net  
Quote: "Not within a thousand years will man ever fly!"  
      -- Wilbur Wright, 1901

-----  
Date: Wed, 6 Jun 2001 12:44:46 -0400  
From: Bill Coleman <aa4lr@arrl.net>  
To: <wb8rcr@arrl.net>, "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>

Subject: [99511] Re: HF and the elevation advantage  
Message-ID: <1010506124446.MAA21558@gate.iterated.com>  
Mime-Version: 1.0  
Content-Type: text/plain; charset="US-ASCII"

On 5/31/01 6:05 PM, John J. McDonough at wb8rcr@arrl.net wrote:

>Now, try getting that 80 meter dipole up 3 wavelengths ... heck, even one  
>wavelength requires a special FAA permit! On HF, antennas are necessarily  
>"low" and their performance is adversely affected by the ground.

Three points.

First, you don't have to get an 80m dipole up three wavelengths for it to be effective. NQ4I has a two-element shortened 80m yagi at 140 feet. That's barely a half wavelength, yet the yagi outperforms local 4-squares.

Second, a dipole isn't that effective on the lowest of the HF bands. Part of the reason is a) you can't get it high enough and b) arrival angles are a lot higher far away from the MUF. W8JI has a bunch of 160m antennas here in Georgia, and he has found that his dipole at 300 feet works better than his many verticals only in the rarest of conditions.

Three, there are certainly plenty of contestors and DXers with big antenna arrays that are not adversely affected by their proximity to ground. In fact, their proximity to ground is part of the antenna system. Also, it is possible to have antennas that are placed "too high" for certain arrival angles -- as often happens on 10m for high yagis near the solar maximum.

Bill Coleman, AA4LR, PP-ASEL            Mail: aa4lr@arrl.net  
Quote: "Not within a thousand years will man ever fly!"  
      -- Wilbur Wright, 1901

-----  
Date: Wed, 6 Jun 2001 10:20:15 -0700  
From: Tayloe Dan-P26412 <Dan.Tayloe@motorola.com>  
To: "'qrp-1@Lehigh.EDU'" <qrp-1@Lehigh.EDU>  
Subject: [99512] Re: Wide posts, how come?  
Message-ID: <87568F78ABDCD211A0AC0008C707718B058C2C8B@az10exm03.sat.mot.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
      charset="iso-8859-1"

I think I was the offending "wide email" sender. I checked my email program "Outlook" and found that there appears to be no setting that can be used to automatically set the wrap length on messages that I send out.

Netscape that I use at home does not seem to have this problem.

I guess I will have to go back to setting the line length by hand.

Arrrrrg!

- Dan Tayloe, N7VE; Phoenix, Az; Az ScQRPions

-----  
Date: Wed, 6 Jun 2001 10:46:48 -0700  
From: "Bill Jones" <kd7s@psnw.com>  
To: <Dan.Tayloe@motorola.com>, "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99513] Re: Wide posts, how come?  
Message-ID: <003f01c0eeb0\$aa33cc30\$9110010a@fresno>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Dan,

If you are using Microsoft's Outlook Express you can control your line length as follows:

Click on Tools  
Click on Options  
Select the 'Send' tab  
Under Mail Sending Format click the Plain Text radio button followed by the Plain Text Settings push button. From there you will see a line that says, "Automatically wrap text at ....."

=====  
Bill Jones - <><  
Sanger, California  
=====

----- Original Message -----  
From: "Tayloe Dan-P26412" <Dan.Tayloe@motorola.com>  
To: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>

Sent: Wednesday, June 06, 2001 10:20 AM  
Subject: Re: Wide posts, how come?

> I think I was the offending "wide email" sender. I checked my email  
> program "Outlook" and found that there appears to be no setting that  
> can be used to automatically set the wrap length on messages that I  
> send out.  
>  
> Netscape that I use at home does not seem to have this problem.  
>  
> I guess I will have to go back to setting the line length by hand.  
>  
> Arrrrrg!  
>  
> - Dan Tayloe, N7VE; Phoenix, Az; Az ScQRPions  
>  
>

-----  
Date: Wed, 6 Jun 2001 14:13:46 -0400  
From: "Ronald A Pfeiffer" <Ronald\_A\_Pfeiffer@raytheon.com>  
To: neqrp@jonal.net, qrp-1@Lehigh.EDU  
Subject: [99514] Results from NEQRP SSB NET Tuesday 7:00PM EDST 7.285 +- 5  
Message-ID: <0F96E147B3.85C7332E-0N85256A63.00635E2C@and.us.ray.com>  
MIME-Version: 1.0  
Content-type: text/plain; charset=us-ascii

Well the noise was horriffic around 7.285 so I started out  
on 7.280. The freq was great and all sigs 59+.

First round yielded

N1EU	Barry	Nr Albany, NY	FT-817 @ 5W
------	-------	---------------	-------------

Second round

W1CFI	Paul	Falmouth, MA	FT-707 @ 10W
K1CL	Chuck	Chelmsford, MA	FT-840 @ 5W
WF1F	Miles	Chelmsford, MA	IC-756PRO @ 5W

Last call for checkins yielded

WA10HR	ev	Windsor, CT	FT-756
--------	----	-------------	--------

NOTE: WITH SUMMER IN FULL SWING THE SSB NET WILL MEET NEXT WEEK AT 7:30PM  
EDST.

Thanks to all who checked in and remember the NEQRP CW NET Thursday at  
8:30PM EDT at 3.565

Your net control was  
N1ZSW        Ron            Worcester ,MA            K2 @ 10W            window in attic

-----  
Date: Wed, 6 Jun 2001 14:51:16 -0400  
From: "Doyle, Ronald D" <RD130947@exchange.DAYTONOH.NCR.com>  
To: qrp-l@Lehigh.EDU  
Subject: [99515] wanted: H/PC 660 LX laptop stuff?  
Message-ID: <0D6CE218BF54D211B37F00E0292657F408C4A850@susdayte03.daytonoh.ncr.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
          charset="iso-8859-1"

I have the opportunity to test drive an HP 660 LX and would like an idea of  
what software is available for it ham related or not.

I have tried searching the QRP-L archives for this year and didn't come up  
with anything. I also looked the website over and the files that looked  
promising I can't get to.:( (probably operator error:( )

72 de Ron, N8VAR

-----  
Date: Wed, 6 Jun 2001 13:46:06 -0500  
From: "Jay Bromley" <w5jay@alltel.net>  
To: <k5mgj@excite.com>, "Low Power Amateur Radio Discussion" <qrp-l@Lehigh.EDU>  
Subject: [99516] Re: The Complete DXer  
Message-ID: <001901c0eeb8\$f2902520\$649b66a6@alltel.net>  
MIME-Version: 1.0  
Content-Type: text/plain;  
          charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Emulate K5ZTY in a QRP fox hunt and well as the other Houston hounds while  
looking for the book. Good operators down there!!

73 de jay..

> I'm looking to buy a copy of "The Complete DXer" by RC Locher. It's out of  
> print and Bill, K5ZTY, has highly recommended it.

>  
> If you have it on a shelf gathering dust, it'll get some use in my shack.  
> Please reply off-list. Thanks!!!!  
>  
>  
>  
>  
>  
>  
> -----  
> Send a cool gift with your E-Card  
> <http://www.bluemountain.com/giftcenter/>  
>  
>  
>

-----  
Date: Wed, 06 Jun 2001 14:00:00 -0500  
From: "John Burnley" <JBurnley@ifmc.org>  
To: <qrp-1@lehigh.edu>  
Subject: [99517] Hamboree 25 and Iowa State QRP Convention.  
Message-ID: <sb1e377a.075@ifmc.org>  
Mime-Version: 1.0  
Content-Type: text/plain; charset=US-ASCII  
Content-Transfer-Encoding: quoted-printable  
Content-Disposition: inline

Hamboree 25 is just around the corner with a lot of QRP fun in the works! =  
=20

The Hamboree will be held June 15-16 at the Marina Inn and Convention=20  
Center in South Sioux City, NE. There will be QRP related sessions on=20  
Friday and Saturday. I'm very pleased to announce the speakers for the=20  
QRP related forums are: Ed Hare (W1RFI), Adrian Weiss (W0RSP),=20  
Jim Duffey (Dr. Megacycle KK6MC), and Walt Holling (N9MZP). Here=20  
are some of the program highlights:=20

Ed Hare (has 3 presentations)- What's the best rig to buy?; Tuna Tin Saga;  
RFI to Amateurs  
Adrian Weiss - SWR - What does it show?  
Jim Duffey - Batteries for QRP  
Walt Hollings, PSK 31=20

Most of these sessions will be held both on Friday and Saturday. Our =  
thanks to=20  
Ed Hare, Adrian Weiss, Jim Duffey, and Walt Holling for doing these FB  
presentations.



On Friday night (June 15), the IA QRP Club will host it's annual (postponed=  
from  
the winter months because of all the lousy wx we had) building contest =  
judging.  
Bring any project completed since the last judging (Jan 2000). Plus there =  
will  
be a building event where the group will get together and assemble a =  
project.

All of the QRP related events are free but there is a fee to enter the =  
hamfest.  
For more info on the hamfest please see the following website:  
[www.3900club.com](http://www.3900club.com) . =20

Our thanks to Jerry Huldeen (WB0T) who has been working feverishly to  
make the QRP portion of the hamfest a reality. Without Jerry's efforts, =  
there  
would not be an IA State QRP Convention.

I hope to see you in Sioux City!

72, John NU0V

-----  
Date: Wed, 6 Jun 2001 13:42:19 -0600 (MDT)  
From: "Paul Harden, NA5N" <na5n@rt66.com>  
To: qrp-canada@neale.gpfn.sk.ca, qrp-l@lehigh.edu  
Cc: nmqrp@yahoogroups.com  
Subject: [99518] OSCOPE TUTORIAL - INTRO  
Message-ID: <Pine.SUN.4.10.10106061328250.3466-100000@shell.rt66.com>  
MIME-Version: 1.0  
Content-Type: TEXT/PLAIN; charset=US-ASCII

Gang,  
Have been getting several requests lately for the oscscope series I've  
posted to QRP-L a few times. So here it is again. Delete the following  
few posts if you already have them/could care less, etc. But for those  
of you new to the groups, you might find them helpful.

THE OSCOPE TUTORIALS ... have been broken down into 4 text files (i.e.,  
none of the html stuff!) to make the files a bit more manageable by  
keeping them less than 10K each, which contain:

O-SCOPES PART 1: Basic oscscope description, calibration and controls  
O-SCOPES PART 2: Measurements: DC and AC voltages; time and frequency  
O-SCOPES PART 3: Measurements: Amplifier gain and Insertion Loss  
O-SCOPES PART 4: Measurements: Phase shifts and delays

There are real-world QRP examples following each measurement topic, of which most can be done with a limited bandwidth scope. This series (with far better illustrations) also appeared in 1997 issues of QRPp. If you missed it, you can obtain back issues from Doug Hendricks, KI6DS.

WHAT SCOPE SHOULD I GET?

And to answer another question I get alot or see on QRP-L ... if you are looking for a good, used and cheap scope, I would highly recommend picking up a Tektronix 465 or 475 (100 and 200MHz BW respectively). Even the older Tektronix 453 series. All are dual-trace scopes, delayed sweep, etc. and the workhorses in the industry for years. You can often find them at hamfests in the \$100 range. I think Tektronix must have made 187 million of them, because they are STILL everywhere, and even at 30 years old, still a dang nice scope! Schematics are easy to come by and most of the internal electronics comprises NPN and PNP transistors. More modern scopes are full of those industry top-secret, proprietous IC's you'll never find a replacement for. Yeah, other older scopes are good ones too, but you just can't go wrong with a good old 465/475.

72, Paul NA5N

-----  
Date: Wed, 6 Jun 2001 13:44:49 -0600 (MDT)  
From: "Paul Harden, NA5N" <na5n@rt66.com>  
To: qrp-canada@neale.gpfn.sk.ca, qrp-l@lehigh.edu  
Cc: nmqrp@yahoogroups.com  
Subject: [99519] OSCOPES - PART 1  
Message-ID: <Pine.SUN.4.10.10106061342251.3466-100000@shell.rt66.com>  
MIME-Version: 1.0  
Content-Type: TEXT/PLAIN; charset=US-ASCII

OSCILLOSCOPES - BASIC USE AND MEASUREMENTS  
by Paul Harden, NA5N

PART 1 - BASIC DESCRIPTION, CALIBRATION AND CONTROLS  
-----

NOTE: This is a text version of an article appearing in the Summer 1997 issue of "QRPP." The article contains numerous illustrations and photos of oscilloscope displays, which unfortunately can not be included in a text file.

#### GENERAL O-SCOPE DESCRIPTION.

THE VERTICAL INPUT is applied to the vertical input amplifier, which is quite sensitive, designed for a 25-50mV input. For larger inputs, the signal is routed through attenuators comprised of simple voltage dividers. These attenuator dividers is what forms the VERTICAL SENSITIVITY, calibrated in mV/division or V/div. An INPUT COUPLING switch selects DC or AC coupling, and sometimes a GROUND position. The output of the vertical input amplifiers is a differential signal, amplified up to high voltages and applied to the CRT (cathode ray tube) vertical plates for deflecting the beam in the vertical axis.

THE HORIZONTAL AMPLIFIERS are driven by an internal sweep generator, amplified to a high voltage and applied to the CRT horizontal plates for deflecting the beam in the horizontal axis ... that is, the sweep that moves the beam from left-to-right.

Thus, for a proper oscilloscope display, such as displaying a sinewave, it is a combination of moving the trace from left to right to show TIME, and up-and-down to show MAGNITUDE.

THE SWEEP GENERATOR is a constant current source charging a capacitor to make a linear sawtooth waveform. The value of the capacitor will determine the time it takes to eventually move the beam across the screen, and is selected by the HORIZONTAL SWEEP control, calibrated in seconds, mS, uS (or nS) per division. The faster the beam moves across the screen, the higher the frequency that can be displayed. An important task of a scope is to display a stable waveform, which is done by starting the sawtooth sweep at exactly the same time in respect to the input signal. A switch labeled TRIGGER SOURCE determines what initiates the sweep. In the INTERNAL position, a sample of the input signal from the vertical amplifiers is used, and when it reaches a certain level, WOOSH, the sweep occurs. In the AUTO mode, the sweep is free running and not necessarily synchronized with the input signal. In LINE position, the sweep is triggered off of 60-Hz from the power supply (useful for synchronizing to TV/VCR signals), and EXTERNAL the sweep is triggered from an external input applied to a BNC (on the front or the back of the scope).

OTHER FEATURES your scope may have are:

- \* Two vertical input channels for dual-trace operation
- \* Two separate time bases for delayed sweep operation
- \* Various modes to display the input signals (alternate, chopped,

A+B added, invert B, A intensified by B, etc.)

\* Built in calibrators

#### CALIBRATING YOUR SCOPE.

Likely, you obtained your scope from a hamfest, the company junk bin, etc. The first thing you should do upon acquiring a scope is to check its calibration.

THE VERTICAL AMPLIFIERS can be checked with a known voltage source, such as a 9v battery. Measure the battery output with an accurate voltmeter. Let's say it's exactly 9v. Set the input coupling to the GND position (0v) and move the trace to the bottom division. Switch the input coupling to DC and set the attenuators to 2v or 5v/div. to give a nearly full scale deflection. For example, if your scope has four vertical divisions, setting the attenuators to 2v/div. would be 8V full scale deflection, and at 5v/div., full-scale would be 20V. With the 9v battery applied, the DC deflection should be 1.8 divisions at 5v/div. Switching to 10v/div., the deflection should be just a bit less than one division. Internal to the scope (or perhaps accessible from the outside) are adjustments for the VERTICAL AMPLIFIER GAIN. Adjust this pot for the proper deflection described above. The procedure can be repeated with a 1.5v battery for the lower sensitivity ranges (which you'll be using more of the time anyway).

Also note that when you adjust the Vertical Amplifier Gain adjustment, the 0v (ground) reference on the bottom division may also shift. So after each adjustment, reposition the trace on the bottom division for 0V input, then recheck the trace position for the 9V or other test voltage you are using to calibrate against. It takes a few times going back and forth to get it right.

THE HORIZONTAL AMPLIFIERS should be checked/calibrated using a signal generator. For example, a 1 MHz signal has a period of 1uS per cycle. Setting the SWEEP RATE to 1.0uS/div., a 1 MHz signal should take EXACTLY one division per cycle. Ensure the horizontal WIDTH control is set so the beam starts at the first division and ends on the last one, and the HOR SWEEP VERNIER (fine adjustment) is in the OFF or CAL position. If the sweep rate appears incorrect, an internal SWEEP GAIN ADJustment can be set for proper display of the test signal. This should be repeated at different frequencies, and some scopes will have a separate adjustment for each time base setting. Once the Sweep Gain has been set as above for 1MHz = 1 cycle per division, go to the next faster sweep speed, which should

usually be 0.5uS/div. In this case, the 1MHz sinewave should take TWO divisions to display a complete cycle, as shown in the quasi-illustration to the right.

1	2	3	4	5
--*--	-----	--*--	-----	
* *		* *		
* *		* *		
*-----*	-----*	-----*	-----*	*

Trigger the scope for a stable display so that the zero crossings or the peaks are on the vertical graticle lines. The illustration shows the positive going "zero-crossings" occurring on the vertical graticles labeled "1" - "3" - "5".

		*   *		*   *
		*   *		*   *
	-----	---**--	-----	---**--
	<---	1.0uS---	>	1MHz sinewave
				at 0.5uS/div.

For proper zero-crossings, the waveform should be centered between two divisions, also as shown in the illustration.

If you can't find the adjustment to tweak the horizontal gain, you can shrink or stretch out the test signal to the desired divisions using the HORIZONTAL WIDTH control, usually a front panel control. Then you can mark on the front panel where the HOR WIDTH control must be at each SWEEP setting for proper calibration.

Without checking and calibrating the accuracy of your time base sweep, time and frequency measurements performed on your scope may contain significant errors.

If you don't have a signal generator, you might use the audio from a receiver tuned to WWV. The various tones transmitted throughout the minute and hour are listed in various references. And of course, there's always 60-cycles floating around the ham shack somewhere!

#### MAIN OPERATOR CONTROLS.

INTENSITY - controls the brightness of the beam. Adjust for a clear trace, but not too bright. A very bright trace can cause permanent damage to the CRT, particularly on a well-used scope.

FOCUS - adjusts the beam for the thinnest and sharpest display.

VERT & HOR POSITION controls the vertical and horizontal position of the trace.

VERT VOLTS/DIV - controls the vertical sensitivity of the display, i.e., how many volts or mV per division.

VERT VERNIER - adjust the vertical sensitivity in fine steps. Should be off (or CAL position) for calibrated measurements.

TIME BASE/HOR SWEEP SPEED - sets the horizontal sensitivity, i.e., how many second, mS or uS per division.

HOR VERNIER - adjusts the horizontal sensitivity, or sweep speed, in fine steps. Should be in OFF or CAL for calibrated measurements.

#### OTHER ADJUSTMENTS YOU MAY FIND:

ASTIGMATISM - With the scope INTENSITY and FOCUS properly set, this adjustment compensates for the curvature of the CRT tube by making it in-focus across the entire sweep. If your trace is out-of-focus in certain areas, but in-focus elsewhere, the ASTIGMATISM needs to be

adjusted.

TRACE ROTATION - is a small coil around the CRT that skews the trace to ensure it is perfectly horizontal. Set the scope to GND, free-run the sweep and adjust the vertical position so the beam is along a graticle (division) line. Adjust the TRACE ROTATION until the beam is perfectly parallel to the horizontal graticles. On scopes without this adjustment, leveling the trace is performed by loosening the CRT mounting brackets and physically rotating the CRT tube for a level trace, then re-tightening the CRT brackets.

!!! WARNING!!! HIGH VOLTAGE ARE PRESENT AROUND THE CRT TUBE. USE EXTREME CAUTION WHEN PERFORMING THE ABOVE PROCEDURE.

DC BALANCE - is a DC offset in the vertical amplifiers that causes a shift in the trace baseline when changing vertical scales. It is most obvious when displaying AC signals. For example, you are displaying a 10Vpp sine wave, centered on the center graticle at 2v/div. Changing to 5v/div, the sine wave shifts away from the center graticle, up or down ... that is, it assumes a DC bias error in the vertical amplifiers. The DC BAL is adjusted until no shift occurs when changing vertical scales. Admittedly, setting the scope for perfect dc balance on all scales is an exercise in patience! DC BAL is often an internal adjustment, or on the rear panel. On dual trace scopes, there will be one for each channel.

HV ADJUST - is the high voltage that controls the intensity of the trace. Turn up the INTENSITY control to its brightest position, then adjust the HV ADJ for a trace slightly brighter than normal intensity. Return the INTENSITY for normal brightness. The INTENSITY control now has the proper range. On some scopes, it takes a little fiddling around to properly set the HV ADJ, intensity and focus for proper operation. The HV ADJ is often an internal adjustment.

!!! If you adjust the HV ADJUST, you may also have to recalibrate the VERTICAL and HORIZONTAL GAINS as described above for proper calibration (V/division and time/division accuracy).

An oscilloscope is an amazing instrument for making voltage, time and frequency measurements ... however, all of these measurements are worthless unless you ensure the vertical and horizontal stages of your scope are reasonably calibrated. The time to calibrate your scope will be worth the ease and reliability of subsequent measurements you will make.

END OF PART 1

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To: qrp-canada@neale.gpfn.sk.ca, qrp-1@lehigh.edu  
Cc: nmqrp@yahoogroups.com  
Subject: [99520] OSCOPES - PART 2  
Message-ID: <Pine.SUN.4.10.10106061344570.3466-1000000@shell.rt66.com>  
MIME-Version: 1.0  
Content-Type: TEXT/PLAIN; charset=US-ASCII

OSCILLOSCOPES - BASIC USE AND MEASUREMENTS  
by Paul Harden, NA5N

PART 2 - LET'S MAKE SOME MEASUREMENTS  
DC voltages, AC voltages, time period and frequency

-----  
NOTE: This is a text version of an article appearing in the Summer 1997 issue of "QRPP." The article contains numerous illustrations and photos of oscilloscopes displays, which unfortunately can not be included in a text file.

#### NOTE ON LIMITED BANDWIDTH SCOPES.

Today's scopes have 500MHz bandwidths or higher. Likely your scope is much less than that. A limited bandwidth scope is still very useful to the QRP'er. Say the bandwidth of your scope is 5MHz. This does not mean you can't see a 7MHz (40M) signal ... it just means that the calibration of the scope is no longer valid. The peak-to-peak value of the display is not correct and much smaller than it really is, and the sweep rate may be in error. But still, you may likely be able to resolve individual cycles higher than the cited bandwidth to a certain degree, and make the gain and phase measurements that follow (since they are based on RATIOS).

Most of the examples in this article explore many regions of a QRP rig without the benefit of any great bandwidth. Experiment with your scope to learn its limitations.

!!! IF POSSIBLE, SPEND THE MONEY TO GET A GOOD SCOPE PROBE AND MAKE MEASUREMENTS WITH A GOOD GROUND CONNECTION TO GET THE MOST OUT OF THE BANDWIDTH YOU HAVE.

## BASIC MEASUREMENTS.

It is assumed you have your scope relatively calibrated as described in Part 1, and familiar with the front panel controls. For the sake of the following discussions (since illustrations can not be included), it is assumed the scope has 4 vertical and 4 horizontal divisions.

## DC VOLTAGES.

Say you want to check the T-R switch (Transmit-Receive) in your QRP rig. Usually this will be a transistor (or inverter gate, such as in the 38-Special). The key line goes to the base, which is pulled HI to some positive voltage (on key UP), and goes LO to ground when the key is DOWN (or closed).

Setup your scope for DC voltage at 2v/div. and a slow sweep speed (say 100mS/div). Set the trace so the bottom graticle (division line) is 0v. Place the scope lead on the T-R switch transistor base. Say the trace deflects two divisions. This would be 4vdc bias on the base. Now close the morse code key. The trace should drop to 0v.

The purpose of the T-R switch is to generate a POSITIVE voltage on key down, which is taken from either the collector or the emitter (depending upon the circuit configuration). Say it comes off the emitter. Move the scope probe to the emitter. Now you should have about 0v with the key UP, and with the key DOWN, the voltage should jump to some positive voltage, often +12v. In this case, the trace will go off the top of the screen. Change the scope to 5v/div. Re-verify that 0v is the bottom graticle. On key DOWN the trace jumps up 2 divisions. The key DOWN voltage is thus +10v. If the emitter is "stuck" at +10v on both key up and down, the transistor is not switching. If the base signal above is correct, then likely the transistor is bad.

While this test could be done with a DVM, the integration time is slow requiring long key downs to get the proper voltage. A scope will also show you how clean the switching is, or if there is an AC voltage (or RF noise) riding on the T-R voltage.

Scopes are thus good DC voltmeters, with about a 5% reading accuracy.

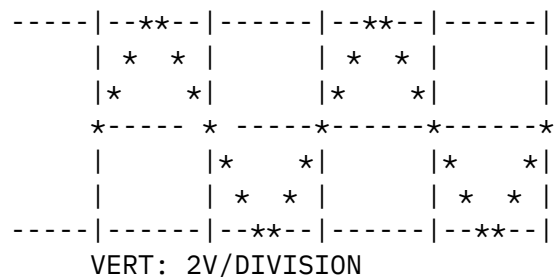
## AC VOLTAGES.

Here is where a scope pays for itself by making AC voltage (and frequency) measurements. You must remember that AC voltage displayed on a scope is PEAK-TO-PEAK VOLTAGE, while a voltmeter or DVM measures AC voltage in RMS (root mean square). RMS voltages read on a DVM will be ABOUT 1/3rd the peak-to-peak voltage (Vpp) shown on a scope. Or specifically,



$$V_{rms} = .707 \times V_{peak} = 0.5(.707 \times V_{pp}) = .35 \times V_{pp}$$

If the signal on your scope looks like that in the quasi-illustration, at 2V/division, then the signal would be 4V peak-to-peak (4Vpp), or 1.4Vrms if read on a DVM or voltmeter.



For example, let's measure the output voltage and frequency of the sidetone oscillator in your QRP rig. Setup the scope for 1v/div, AC volts, and a sweep speed of 1mS/div. Connect the scope probe to the audio output of your rig and set the volume control on key DOWN so the audio sinewave is 2 division peak-to-peak. This would then be 2Vpp AC, and should look similar to the illustration above.

#### AC FREQUENCY MEASUREMENT.

With this same waveform, we might as well see what frequency our sidetone or transmit-offset is at. Most operators prefer the sidetone to be about 700Hz. With the same setup as above, trigger the scope for a stable waveform and the time base sweep to display 2 or 3 cycles. Center the waveform on the center horizontal graticle so the sinewave goes one division above, and one division below the center graticle. Now move the HOR POSition so the first "zero crossing" of the sine wave is on the first or second vertical graticle. With this setup, zero-crossing would be where the sine wave crosses the center horizontal graticle. Now measure the time it takes to make one complete sine wave, from one zero-crossing (sine wave going positive) to the next positive going zero crossing.

Say one complete sine wave takes one and half horizontal divisions. At 1.0mS/div., this would be 1.5mS per cycle. Frequency is the reciprocal of time, such that the sidetone frequency is:

$$f = 1/t = 1/1.5mS = 667 \text{ Hz}$$

(Sidetone frequency is the tone heard on key DOWN). This may be a little low to your liking. To raise it to 700Hz, calculate the period of 700Hz, which is  $t = 1/f = 1/700 = 1.4mS$ . At 1.0mS/div, you can adjust your XMIT OFFSET on key down until zero-crossings (or the positive peaks) are 1.4 divisions apart. This will be 700 Hz. (The XMIT OFFSET is not adjustable in all rigs ... such as the 38-Special. In this case, it usually requires changing the value of a capacitor on the XMIT MIXER and usually discussed in the instruction manual).

QUALITY OF THE WAVEFORM is another feature of a scope that is unsurpassed, since you are "seeing" the waveform in real time. For example, say the audio output from your QRP rig is not a clean sine wave, that is, it has a slant to it, or the rise time takes longer than the fall time. This could be due to improper time constant on the audio amplifier coupling capacitors or improperly biased amplifiers. Or, say the audio output sine wave is flattened at the top, looking sorta like a square wave then a sine wave. This would be a raspy sounding sidetone, and due to the audio power amplifier being overdriven and in gain compression (clipping). You should be able to see this effect by turning the volume control to its maximum level, overloading the output audio amplifier (unless your QRP rig has anemic audio like some).

The o-scope is an invaluable tool for detecting and diagnosing such distortions and impurities in the signal quality. The audio output of a QRP rig, whether the sidetone or an on-the-air signal, should be a fairly pure sine wave. If not, something is wrong, from a poor product detector action, poor filtering after the product detector, poor coupling capacitors, or severe noise being introduced into the audio at some point.

By tuning in an on-the-air signal and plotting the Vpp at different audio frequencies, you can plot the filter response of your QRP rig. This will be discussed in detail in a later section. You can also adjust your BFO on the product detector for the maximum Vpp of the received signal for centering the signal in the filter passband. Note how these important tests and adjustments (sidetone, filter response and setting the BFO) are a few of the things that can be done on a scope with a very limited bandwidth ... since you're not looking at anything beyond the audio range.

Once you get comfortable making the above voltage, time and frequency measurements, you might want to go through your QRP kit with the schematic and record the various DC and AC voltages and waveforms at pertinent locations in the circuit. This will be a great aid in the future should your rig develop a problem. NOTE however, that signal levels from the receive mixer through the IF crystal filters are VERY weak and can not be seen on even an excellent scope. The main exception to this would be the local oscillator (LO) drive on pins 6 and 7 on a NE602. They are usually in the order of 100mVpp.

!!! NOTE: You can't hurt anything by probing around the circuit of your QRP rig. The biggest mistake made by beginners is to let the ground lead come loose and drag along the tops of components, which can short out the power supply or damage a component ... OR when putting the scope probe on an IC pin, to slip and let the probe touch two pins at once. This will short out the two

pins, which in some cases, could cause damage to the IC. For example, on a NE602, measuring the Vcc voltage on pin 8. A slip to Pin 7 (the OSC input) could destroy the internal oscillator if the pin 8 to 7 short persisted a second or two.

END OF PART 2

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Date: Wed, 6 Jun 2001 15:46:21 -0400  
From: "Richard Brummer, K2JQ" <k2jq@bestweb.net>  
To: <jliving2001@yahoo.com>  
Cc: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99521] OSCILLOSCOPE  
Message-ID: <006201c0eec1\$75787020\$4c05b3d8@obvious>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

There is a guy in Tucson, AZ who purchases and refurbishes oscilloscopes and other test equipment.

After doing an Internet search and coming up with his name, I'm pretty sure that it's:

Lew Coppes lcoppes@primenet.com

You can send him a message with "Request List" in the Subject line.

Additional contact info is as follows:  
Lew Coppes Tucson, AZ lcoppes@primenet.com  
Voice: 520-749-8471  
FAX: 520-760-7780

This may be a good route for you to follow.

73,  
Dick K2JQ

-----  
Date: Wed, 6 Jun 2001 13:48:03 -0600 (MDT)  
From: "Paul Harden, NA5N" <na5n@rt66.com>  
To: qrp-canada@neale.gpfn.sk.ca, qrp-1@lehigh.edu  
Cc: nmqrp@yahooogroups.com  
Subject: [99522] OSCOPES - PART 3  
Message-ID: <Pine.SUN.4.10.10106061346540.3466-1000000@shell.rt66.com>  
MIME-Version: 1.0  
Content-Type: TEXT/PLAIN; charset=US-ASCII

OSCILLOSCOPES - BASIC USE AND MEASUREMENTS  
by Paul Harden, NA5N

PART 3 - LET'S MAKE SOME MEASUREMENTS  
Amplifier gain and insertion loss  
-----

NOTE: This is a text version of an article appearing in the Summer 1997 issue of "QRPP." The article contains numerous illustrations and photos of oscilloscopes displays, which unfortunately can not be included in a text file.

#### AMPLIFIER GAIN

The gain of an amplifier can be measured in terms of VOLTAGE GAIN, which is simply  $A_v = V_{out}/V_{in}$ . For example, if the input to an amplifier is 1Vpp, and the output is 4Vpp, then the amplifier has a VOLTAGE gain of 4.

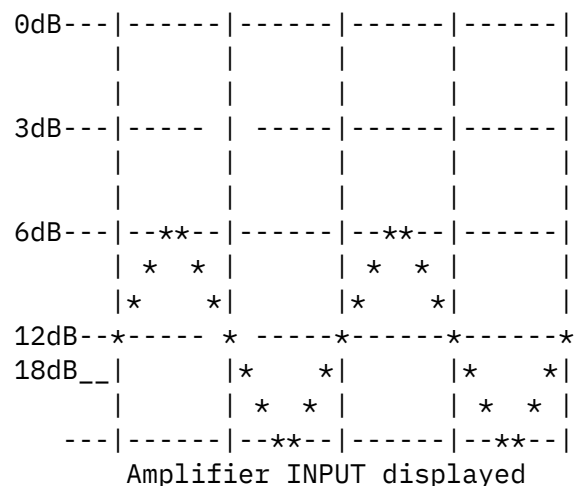
GAIN IN DB is often more useful and is how the gains of amplifiers are usually expressed. With dB (decibels), everytime you DOUBLE the AC voltage, you ADD 6dB of gain. It is the RATIO of output to the input, and this RATIO is easy to measure on a scope, even for signals that exceed the cited bandwidth of your scope to some extent.

Say you just built a single transistor amplifier to boost the audio signal before the final audio amplifier (usually an LM386). It is often easier to start with the OUTPUT for measuring amplifier gain. Inject an audio signal into the amplifier (transistor base). Place the scope lead on the transistor COLLECTOR, and set the scope so the output waveform is exactly 4 divisions peak-to-peak. Do not disturb oscscope settings.

Now move the scope leads to the amplifier INPUT, the transistor's base. You will of course have a much smaller signal, and the ratio

of the input to the output will be the gain in dB. For example, say the input signal is 2 divisions peak-to-peak. This would be 6dB of gain, since you are DOUBLING the signal in the amplifier. Everytime you DOUBLE the voltage, it is 6dB of VOLTAGE gain. If the input signal is 1 division peak-to-peak, then the amplifier gain is 12dB. (With the output still at 4Vpp or 4 divisions). Going from 1 division to 2 division is 6dB gain; going from 2 divisions to 4 divisions is 6dB gain. Therefore going from 1 division to 4 divisions is 12dB (6dB + 6dB).

This illustration shows how to measure Amplifier GAIN on an oscilloscope. FIRST, adjust the scope so the amplifier OUTPUT is 4 DIVISIONS peak-to-peak. THEN, switch to the INPUT, and position the waveform so the NEGATIVE peaks are on the bottom division, as shown. Where the POSITIVE peaks of the input occur will be the GAIN in dB by reading the scale on the left. You may want to make such a scale and attach it to the side of your CRT screen for making quick measurements in dB's.



IF YOU WANT TO DO IT MATHEMATICALLY ...

$V_{out} = 4V_{pp}$

$V_{in} = 1V_{pp}$

Therefore, voltage gain  $A_v = V_{out}/V_{in} = 4v/1v = 4$

and gain in dB is:

$dB = 20\log(A_v) = 20\log(4) = 20(0.602) = 12dB$

OR AS SHOWN DIRECTLY ON THE O-SCOPE AS DESCRIBED ABOVE.

Since this is a relative measurement (a RATIO), the absolute value of  $V_{in}$  or  $V_{out}$  does not need to be determined.

INSERTION LOSS.

In some circuits, such as filters or attenuators, the LOSS in dB needs to be determined, and this is called the INSERTION LOSS. It is determined the same way as amplifier gain, except the INPUT will be GREATER than the OUTPUT since there is a LOSS involved.

For example, with a signal generator connected to your QRP rig antenna input, you want to measure the insertion loss of your IF crystal filter. At the filter input, you can just barely squeek

out 2 divisions of input signal on your scope at its most sensitive setting. (Perhaps due to exceeding the scope's bandwidth). The output from the crystal filter is 1 division, or a 50% reduction. The insertion loss would be 6dB (since if the power were HALF, or 50%, it would be a 6dB LOSS).

OR MATHEMATICALLY USING SCOPE DIVISIONS:

$$\begin{aligned}\text{Insertion loss (dB)} &= 20\log(V_{in}/V_{out}) = 20\log(2 \text{ div.}/1 \text{ div.}) \\ &= 20\log(2) = 20(.30) = 6 \text{ dB}\end{aligned}$$

If the output were 1.5 divisions,

$$\text{Insertion loss (dB)} = 20\log(2 \text{ div}/1.5 \text{ div}) = 2.5 \text{ dB}$$

Again, you are determining the insertion loss of a circuit element from the RATIO of input to output. You do not need to make absolute measurements. So if the frequency is beyond the bandwidth of your scope, as long as you can get enough vertical deflection to measure it's magnitude in some terms of divisions, and able to see the signal either get smaller or larger, you can estimate the gain or loss in dB fairly accurately. If the signal DOUBLES, it is 6dB; if it is about half of doubling, it is about 3dB; if the change is barely noticeable, it is around 1dB. This is usually sufficient for determining if circuit elements are working properly. For example, using the insertion loss of an IF crystal filter as above, if you determine the loss to be a few dB, the crystal filter loss is acceptable. If it is much more than around 6dB, you may have a problem. And if you can't see any output, you have a real problem. (Loss is about 1 to 1.5 dB per crystal in filter). Same with checking the gain of amplifiers. It's not important if the gain is 6.2 dB or 6.5 dB, but whether the gain is ABOUT what you'd expect. If the output of an amplifier is ABOUT DOUBLE the input, you have 6dB of gain. If the output is just a bit larger than the input (or the same) ... then you've got a problem (no or little gain occurring).

With a little practice on your o-scope, you will learn to recognize approximate gains and losses in dB's very quickly from the oscilloscope display.

You might want to go through your QRP kit with the circuit and measure the gains through different stages. If your rig has an MC1350 IF amplifier, what is it's gain with a strong signal vs. a small signal to see if the AGC is working properly. What is the gain of the LM386 audio output amplifier? With larger bandwidth scopes, check the gains of the RF driver transistor and output PA transistor. Knowing what these gains are could help troubleshoot the circuit later should a problem develop.

END OF PART 3

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Date: Wed, 6 Jun 2001 13:50:35 -0600 (MDT)  
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To: qrp-canada@neale.gpfn.sk.ca, qrp-1@lehigh.edu  
Cc: nmqrp@yahoogroups.com  
Subject: [99523] OSCOPE - PART 4  
Message-ID: <Pine.SUN.4.10.10106061348270.3466-100000@shell.rt66.com>  
MIME-Version: 1.0  
Content-Type: TEXT/PLAIN; charset=US-ASCII

OSCILLOSCOPES - BASIC USE AND MEASUREMENTS  
by Paul Harden, NA5N

PART 4 - MEASURING PHASE SHIFTS  
-----

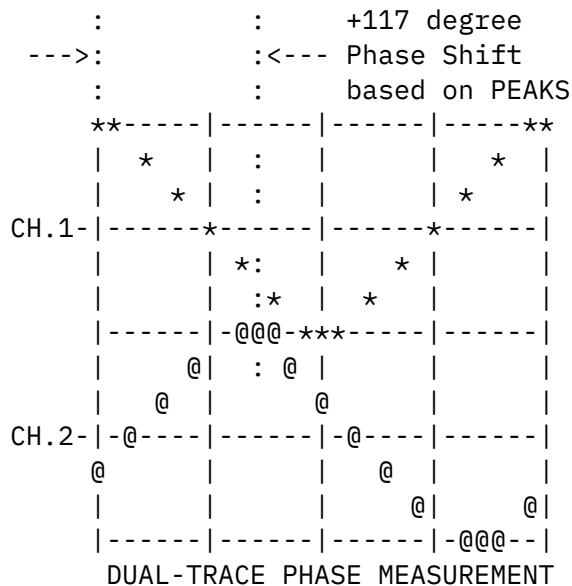
#### MEASURING PHASE SHIFTS

Phase relationships between two signals at the same frequency can be measured with 2-5 degree accuracy with a scope, although more suited for a dual-trace scope. The REFERENCE signal is applied to CH. 1 and the signal to be phase measured to CH. 2. For proper phase measurements, ensure your dual trace display is in the CHOPPED mode, not ALTERNATE mode. (Alternate mode can effect the triggering position for the second, or CH.2 sweep).

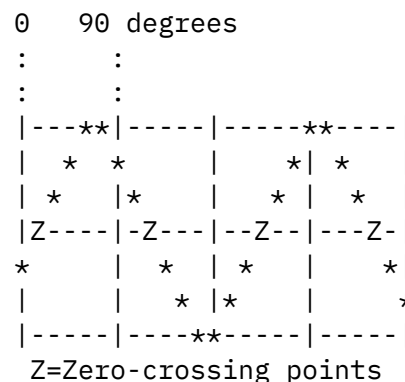
There are many methods to do this. One is to stretch out the signal so it takes 4 full divisions, so each division is 90 degrees of phase. By measuring from a common point on one signal to the other (zero crossings or from the peaks), the phase can be measured.

For example, say you are making a phased array antenna system, in which one feedline must cause a 90 deg. delay. You calculate the electrical length for a quarter wavelength [ $L = (246/f) \times \text{velocity factor}$ ] and cut the coax to that length. You are now working on blind faith that you have exactly 90 degrees. With a scope, you can measure it fairly accurately by injecting a signal into one end with a signal generator (at the frequency of interest) and a 50-ohm load

on the other. Connect the scope CH.1 to the coax input (signal generator end) and CH.2 to the load end and measure the phase. Trigger the scope and move the horizontal position and/or the time base vernier so the positive peak of the CH.1 sinewave is on the first vertical graticle line and the second positive peak is on the fourth vertical graticle, as shown in the illustration to the right. Now measure the phase by noting where the first positive peak on CH.2 occurs. Say it occurs about 1.3 divisions to the RIGHT of the CH.1 positive peak. Since one division is 90 degrees, using this method, then  $1.3 \text{ div.} \times 90 \text{ deg.} = 117 \text{ deg.}$  YOUR DELAY LINE IS TOO LONG! Cut off an inch or two at a time until the CH.2 peak is one division from the CH.1 peak (or on the 2nd vertical graticle as shown in the illustration) for precise tuning of the delay line.



Another method is to make the CH.1 signal to be two divisions high, and center it between the two divisions, such that the zero-crossing points are on the middle graticle line. Where the CH.1 sinewave signal crosses zero going positive is the 0 deg. REFERENCE; the positive peak is 90 deg.; the negative going zero crossing is 180 degrees, etc. For CH.2 to be 90 degrees delayed from CH.1, the CH.2 sinewave should cross zero, going positive, right under the 90 degree peak of the CH.1 signal. If the CH.2 zero crossing is farther to the right from the CH.1 positive peak, the phase shift is MORE than 90 degrees. Back to the example of the coaxial delay line, you would cut an inch or two at a time until the CH.2 zero crossing is directly underneath the CH.1 positive peak (the 90 degree point).



And still yet another method of comparing the phase between two signals on a dual-trace scope is to accurately measure the period



it takes for one complete sine wave on the CH.1 reference channel. Say it is 140nS (that would be 7.14 MHz, by the way). Now say the CH.2 signal is 50nS delayed from the CH.1 signal. The phase shift would be:

$$\text{Phase} = 50\text{ns}/140\text{ns} \times 360 \text{ degrees} = 129 \text{ degrees}$$

#### POSITIVE OR NEGATIVE PHASE SHIFT?

One thing you must remember is how to "read" phase shifts on an oscilloscope. When comparing two signals as described above, remember that if the CH.2 signal peak is to the RIGHT of the CH.1 peak, then the CH.2 signal is OCCURRING LATER IN TIME than the CH.1 signal, because time is traveling from left to right. If the CH.2 peak is say 90 degrees to the LEFT of the CH.1 peak, then the CH.2 signal occurred in time BEFORE the CH.1 signal. This would then be a -90 degree phase shift, or 270 degrees. Think about this carefully before you start cutting the coax on that delay line!

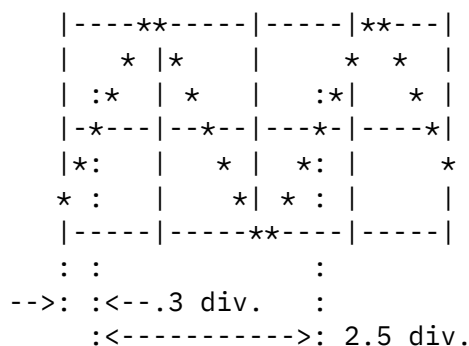
#### PHASE MEASUREMENTS ON A SINGLE TRACE SCOPE

Phase measurements can be made on a single trace scope as well. First, connect the REFERENCE signal, using a BNC "T", to both the VERTICAL INPUT to the scope and the EXTERNAL TRIGGER and select EXTERNAL as the trigger SOURCE. Adjust the TRIGGER LEVEL so the zero-crossing occurs at the beginning of the trace on the first vertical graticule. Now remove the reference signal from the scope's vertical input (but NOT the external trigger input) and connect the signal to be phase measured to the vertical input ... WITHOUT altering the time base or trigger level. The sinewave of the signal to be tested should be on the CRT, with the trace being triggered from the external trigger input, or the reference signal.

The sinewave now on the CRT likely will not have it's zero-crossing starting at the first vertical graticule as the reference signal did, but some place else. On the illustration to the right, the zero crossing occurs about 0.3 divisions to the RIGHT. This can now be converted to the phase angle in degrees. In the illustration, one complete cycle takes 2.5 divisions, and the phase delay from the reference is 0.3 div.

The phase shift is therefore:

$$\begin{aligned} \text{Phase shift} &= 0.3 \text{ div}/2.5 \text{ div.} \times 360 \\ &= 0.12 \times 360 = 43 \text{ degrees} \end{aligned}$$



SINGLE TRACE SCOPE  
PHASE MEASUREMENT

The SINGLE-TRACE scope method is a little easier to do if you make the sine wave of the reference to be 4 divisions for one cycle, thus

making 90 degrees per division. The phase angle can be guesstimated a little quicker with the signal to be phase measured.

It is noteworthy to mention that the above examples, measuring the phase through a delay line at 7 MHz, would require an oscilloscope with a 20MHz or higher bandwidth, if for no other reason, then just assure that the time base is fast enough to display 1 or 2 sinewave cycles on the CRT. If at your fastest sweep speed, the 7MHz signal is displayed as many cycles, then obviously the accuracy that you can determine the phase angle will be highly degraded.

#### LOW FREQUENCY PHASE SHIFTS ON A LIMITED BANDWIDTH SCOPE.

If your scope has a limited bandwidth of only a few MHz or less, there are still useful phase measurements that can be performed.

One interesting experiment is to measure the phase shift of the audio signal at different frequencies as it travels through the stages in a CW audio filter. This is done by putting the input to the CW audio filter on CH.1 and the output on CH.2. What is the phase shift of the wanted vs. unwanted frequencies? Recall that an audio filter works by cancelling out (180 degree phase shift) the unwanted signals, while re-enforcing (0 degrees) the frequencies you wish to pass. There will only be one audio frequency for which there is a 0 degree phase shift. This will be the "pole frequency" of the active filter, or the frequency you wish to have the maximum gain. For CW QRP rigs, this should be around 700 Hz.

And finally, on a limited bandwidth scope, the phase angles of higher frequencies can be determined by applying the reference signal to the vertical input and the signal to be phase measured on the external horizontal input. This will form a lissajous pattern, the angle or tilt will signify the phase angle.

END OF PART 4

-----  
This is the last part of this series of articles on OSCOPES posted to QRP-L. There will be another series on scope measurements posted in the future (many months) that will include some advanced techniques, such as measuring sideband rejection, tuned circuits, filter responses, group delay, VCO phase noise, etc. This will be the contents of part 2 of the oscilloscope article for the Winter QRPP. I haven't written it yet or made hardcopies of the scope displays. But following publication in QRPP, I will convert it to a text file and post it to QRP-L as I did this one.

PS - making those waveform illustrations really sucked swampwater!

72, Paul Harden, NA5N  
NA5N@Rt66.com

-----  
Date: Wed, 6 Jun 2001 14:09:33 -0600  
From: "Rod Cerkoney, N0RC" <rod@n0rc.com>  
To: "Flying Pigs" <fpqrp-1@mpna.com>, "Elecraft-list" <elecraft@qth.net>, "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99524] NFS 1N4148 diodes ALL GONE  
Message-ID: <006f01c0eec4\$9a9ec130\$6401a8c0@c919125b>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Sorry folks,

All the diodes are gone, Thank you all for you response to my offer.

If you have not received an email from be with payment instruct please contact me ASAP!!!

Maybe next time I do 2n2222s ;-)

73, Rod N0RC  
Ft Collins, CO

\*\*\*\*\*  
                    SuperFest 2001 14-Jul-2001  
            <http://www.qsl.net/n0rc/hamfest/hamfest.html>  
                    BE THERE!  
\*\*\*\*\*

-----  
Date: Wed, 06 Jun 2001 13:24:36 -0700  
From: Phil Wheeler <w7ox@earthlink.net>  
To: na5n@rt66.com  
Cc: Low Power Amateur Radio Discussion <qrp-1@Lehigh.EDU>  
Subject: [99525] Re: OSCOPE TUTORIAL - INTRO  
Message-ID: <3B1E9184.5102E69B@earthlink.net>

MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii  
Content-Transfer-Encoding: 7bit

Paul,

How do these four articles relate to the two in QRPP a few years back?  
Or did I miss two of four in QRPP?

Phil W7OX

"Paul Harden, NA5N" wrote:

>  
> Gang,  
> Have been getting several requests lately for the oscscope series I've  
> posted to QRP-L a few times. So here it is again. Delete the following  
> few posts if you already have them/could care less, etc. But for those  
> of you new to the groups, you might find them helpful.  
>  
> THE OSCSCOPE TUTORIALS ... have been broken down into 4 text files (i.e.,  
> none of the html stuff!) to make the files a bit more manageable by  
> keeping them less than 10K each, which contain:  
>  
> O-SCOPES PART 1: Basic oscscope description, calibration and controls  
> O-SCOPES PART 2: Measurements: DC and AC voltages; time and frequency  
> O-SCOPES PART 3: Measurements: Amplifier gain and Insertion Loss  
> O-SCOPES PART 4: Measurements: Phase shifts and delays  
>  
> There are real-world QRP examples following each measurement topic,  
> of which most can be done with a limited bandwidth scope. This series  
> (with far better illustrations) also appeared in 1997 issues of QRPP.  
> If you missed it, you can obtain back issues from Doug Hendricks, KI6DS.  
>  
> WHAT SCOPE SHOULD I GET?  
> And to answer another question I get alot or see on QRP-L ... if you  
> are looking for a good, used and cheap scope, I would highly recommend  
> picking up a Tektronix 465 or 475 (100 and 200MHz BW respectively). Even  
> the older Tektronix 453 series. All are dual-trace scopes, delayed  
> sweep, etc. and the workhorses in the industry for years. You can often  
> find them at hamfests in the \$100 range. I think Tektronix must have  
> made 187 million of them, because they are STILL everywhere, and even at  
> 30 years old, still a dang nice scope! Schematics are easy to come by  
> and most of the internal electronics comprises NPN and PNP transistors.  
> More modern scopes are full of those industry top-secret, propoietous  
> IC's you'll never find a replacement for. Yeah, other older scopes are  
> good ones too, but you just can't go wrong with a good old 465/475.  
>  
> 72, Paul NA5N

-----  
Date: Wed, 6 Jun 2001 14:13:11 -0700 (PDT)  
From: Curt Milton <wb8yyy@yahoo.com>  
To: Low Power Amateur Radio Discussion <qrp-1@Lehigh.EDU>  
Subject: [99526] Re: HF and the elevation advantage  
Message-ID: <20010606211311.33901.qmail@web9601.mail.yahoo.com>  
MIME-Version: 1.0  
Content-Type: text/plain; charset=us-ascii

Interestingly, while higher is generally better for horizontal antennas - and indeed ideal for VHF line of sight propagation - for VHF skip propagation remarkable results can be had with fairly low antennas because at modest heights (20-30 ft) this is already greater than a full wavelength at 6 meters! while i wish my VHF antennas were at 50+ feet, for E-skip and F-skip i get good results!

curt wb8yyy

--- Bill Coleman <aa4lr@arrl.net> wrote:  
> On 5/31/01 3:46 PM, Garie Halstead at  
> k8kfj@ntelos.net wrote:  
>  
> >A question for you propagation gurus out there....  
> >  
> >I regularly work the VHF contests every year where  
> elevation is  
> >extremely advantageous. On the HF bands, I  
> understand it would  
> >also be an advantage on 10m and probably to a  
> certain extent on 15m.  
> >  
> >\*\*\*But what about 20m and down?\*\*\* (Other than  
> having an unobstructed  
> >shot in all directions).  
>  
> The answer (as always) is, "it depends."  
>

-----  
Do You Yahoo!?

Get personalized email addresses from Yahoo! Mail - only \$35  
a year! <http://personal.mail.yahoo.com/>

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Date: Wed, 6 Jun 2001 16:29:10 -0500  
From: "Rick Austin" <rick@ltcable.com>  
To: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99527] Interesting Used Scope and Test Equipment Site  
Message-ID: <000501c0eecf\$bafda580\$0201a8c0@ricksnote>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Hi gang,

Ran across a site that provides pricing (high/low/average) of scopes, probes and other equipment as determined by past ebay auctions.

"Veddy interesting"

Rick Austin

<http://www.vaxxine.com/phil/scopes/test.htm>

-----  
Date: Wed, 6 Jun 2001 15:53:15 -0600  
From: "Rod Cerkoney, N0RC" <rod@n0rc.com>  
To: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>, "Elecraft-list" <elecraft@qth.net>, "Flying Pigs" <fpqrp-1@mpna.com>  
Subject: [99528] email change notification  
Message-ID: <01c901c0eed3\$17984860\$6401a8c0@c919125b>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Folks,

Please update your email address books. Effective immediately my email is:

n0rc@arrl.net --OR-- rod@n0rc.com

All other email accounts are in a one week phase out period.

I'm ditching all these freebie deals like Hotmail & Yahoo to much spam and/or poor performance! If you are interested in a good deal check out <http://www.dotster.com> There you can register a domain name (I

bought n0rc.com), get at POP/Web mail account and web site URL  
redirect for only \$30!!!

A thousand pardons for the blast-o-gram, but with the diode deal  
winding up I wanted to make sure I don't miss any mail

73, Rod N0RC  
Ft Collins, CO

\*\*\*\*\*  
SuperFest 2001 14-Jul-2001  
<http://www.qsl.net/n0rc/hamfest/hamfest.html>  
BE THERE!  
\*\*\*\*\*

-----  
Date: Wed, 6 Jun 2001 18:06:07 -0400  
From: "Ron Polityka" <wb3aal@fast.net>  
To: ". QRP-L" <qrp-l@Lehigh.EDU>, ". NJ QRP-L" <njqrp@njqrp.org>, ". Eastern PA  
QRP Club" <epaqrp-l@Lehigh.EDU>  
Subject: [99529] TAC 2001 Sprint Results  
Message-ID: <001101c0eed4\$e43aa560\$45125cd1@wb3aal>  
MIME-Version: 1.0  
Content-Type: text/plain;  
charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Hello,

I am updating the EPA QRP Club web site daily  
for the TAC 2001 Sprint results.

72 & 73  
Ron de WB3AAL  
[www.n3epa.org](http://www.n3epa.org)

-----  
Date: Wed, 6 Jun 2001 15:05:21 -0700 (PDT)  
From: "Robert P. Okas" <vintage@best.com>  
To: qrp-l@lehigh.edu  
Subject: [99530] MH101: Transmit strip completed!  
Message-ID: <Pine.BSF.4.21.0106061059580.28016-100000@shell14.ba.best.com>  
MIME-Version: 1.0

Content-Type: TEXT/PLAIN; charset=US-ASCII

Hi Gang,

After getting the vfo up and running, I decided to forge ahead on the transmit side of the rig. As the subject line suggests, I finally completed it last night and got "first RF" out of the rig. It was an interesting path leading to this result. If anyone is interested in my layout, I can email you several photos of the various stages under construction.

I learnt a few interesting things along the way. The first device I had installed at the Q6 position was an NTE-235, a 2SC2078 equivalent so the book says. With the output filter installed, I was only able to squeak out about 600mW. The filter components were measured before they were installed, so this wasn't the source of the problem. The final wasn't producing enough RF. I decided to check impedance matching between the driver and the final. That required a trip to my reference bookshelf.

The standing driver current measures 29 mA in my rig. This is a Class A amp. Using the formula,  $RL = V_{cc} / (1.3 * I)$ , I determined that the optimum load for Q5 is around 360 Ohms, based on a 13.5V supply. The driver output transformer, T4, has a 10:1 turns ratio. This means that the secondary load must be 3.6 Ohms to provide the correct load impedance for the driver. To check the driver output power, I lifted the base lead of the final and tacked in a 3.9 Ohm resistor. This value, when paralled with R29 (56 Ohms in my case) produces the desired load. With this setup, I observed a 1.5Vpp sine wave across the 3.9 Ohm resistor. This equates to 80mW of RF that is available to drive Q6, which should be more than adequate.

After some head scratching, I decided to replace the NTE part with a 2SC1975 which I had in my junkbox. That made all the difference! I'm able to get over 3.5 watts output now using a 13.5V supply. With the drive pot adjusted for a 2 watt output, I measured the final's efficiency at 74%. This new transistor is obviously a higher gain device. The NTE data sheet indicates that 200 mW is typically required to produce 4 watts of output at 11m, so my particular unit is probably OK.

I'm satisfied with these results and pleased that I got a chance to dig into the circuitry and do some debugging & analysis. Way Cool!

73,  
Bob - W3CD



-----  
Date: Wed, 6 Jun 2001 16:17:44 -0600  
From: "T.W." <wb5qyt@abq.com>  
To: <qrp-1@lehigh.edu>  
Subject: [99531] Nice site  
Message-ID: <MABBIKAEJKMHLIDDGMCKOEFJCKAA.wb5qyt@abq.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="Windows-1252"  
Content-Transfer-Encoding: 7bit

Gang,

This web page has it all...One of the best I've seen for Amateur Radio and DX Reference Site info.

<http://www.ac6v.com>

72, Tom WB5QYT...."Have spud will travel!"

-----  
Date: Wed, 6 Jun 2001 19:40:29 -0300  
From: "Dave Marling" <dbm@klis.com>  
To: "Low Power Amateur Radio Discussion" <qrp-1@Lehigh.EDU>  
Subject: [99532] Re: Wide posts, how come?  
Message-ID: <001e01c0eed9\$b0fa9520\$e0acb0cf@klis.com>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

In OUTLOOK EXPRESS click on TOOLS/OPTIONS/SEND

Make sure you have Plain Text checked. Click on Plain Text Settings.  
Change "Automatically wrap text..." to the length you desire.

If you have HTML checked instead of Plain Text you risk the wrath of all those with older browsers or reflectors with HTML rejection.

Dave  
VE1VQ

-----  
Date: Wed, 6 Jun 2001 17:47:27 -0500  
From: "Rick Austin" <rick@lrcable.com>  
To: "Low Power Amateur Radio Discussion" <qrp-l@Lehigh.EDU>  
Subject: [99533] Tektronix 547 Probes?  
Message-ID: <00b101c0eeda\$aa44f120\$0201a8c0@ricksnote>  
MIME-Version: 1.0  
Content-Type: text/plain;  
        charset="iso-8859-1"  
Content-Transfer-Encoding: 7bit

Through the generosity of Ed Manuel (N5EM) in Houston, I now have a 547, Scope Cart and 53/54C, 82, and B plug ins but no probes. Loaded in the car during the worst of Tropical Storm Allison yesterday - 5-10 inches of rain in an hour or two.

The 547 looks familiar. I think I used one of these back in the late 60s to troubleshoot Cockpit Display Avionics that we were designing at Norden in Norwalk, CT for the F111D.

What probes would be appropriate for general HF troubleshooting work around the shack?

Rick Austin  
KD5LAQ

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End of QRP-L Digest 2212

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